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THE IRON AGE

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JULY 15, 1937

ESTABLISHED 1855

Vol. 140, No. 3

It's About Time!

THERE are indications that the Administration is at last beginning to recognize the political danger involved in blindly and persistently throwing its weight to the Lewis labor minority. How else can one explain the remarkable about-face of Madam Perkins in the matter of the legality of sit-down strikers. Surely, it was not a change of heart but rather a change of orders that brought about this reversal of form in one who has been such an ardent supporter of the CIO.

The political mind is hard to fathom but you can always count upon its highly developed instinct of self-preservation. It may have recognized, rather late perhaps, the fact that the Administration was helping to build an engine for its own destruction, creating a monster which at its maturity would turn upon and rend its maker. However it may be, from now on, CIO will have harder sledding. It will have to earn what comes to it.

Thus far, CIO has **not** earned what it has gotten. It did not earn a victory in Flint, nor Detroit, even though it won a decision. A pugilist cannot be said to have won a contest when the referee and timekeeper sandbag his adversary for him.

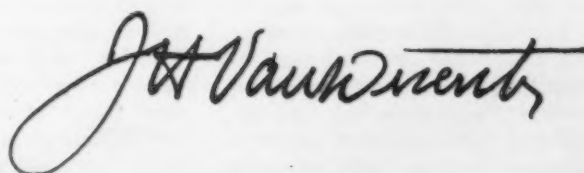
It is not hard for a union organizer to enroll membership when he has the backing of important Federal departments, of state and local governments, and when the state militia is subject to his orders. Even some of our early Christian forebears recanted under less impressive persuasion. Probably some of them had their fingers crossed.

The average worker is not to be censured for joining the CIO unions, or any other organization for that matter, if he is led to believe that the cost of not signing on the dotted line may be the loss of his job or his health and home. And especially if he received, as so many workers have, a letter purporting to come from the President, urging him to enroll under the Lewis leadership.*

Forcing a man to sign a union application is much easier than to get him to continue to pay his dues, especially if he has joined with his fingers crossed. Mr. Lewis is a sufficiently keen strategist to realize this and he knows that unless he can secure the closed shop and the check-off, the CIO balloon will deflate as rapidly as it inflated, once the government pressure and backing are removed.

Undoubtedly the CIO management has hoped against hope that the inevitable rift with the Administration could be postponed until the second step had been taken and the closed shop and check-off forced upon industry. It looks as though Frankie and Johnny had come to the parting of the ways. **It's about time!**

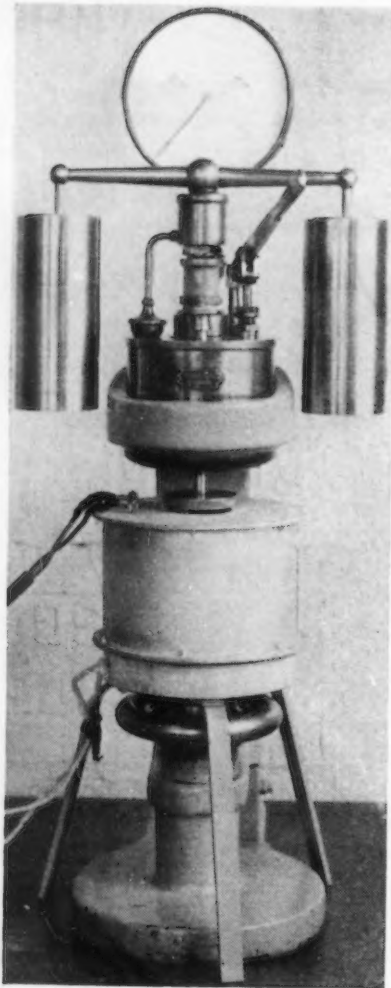
* See THE IRON AGE, Feb. 18, 1937, page 55.



HOT HARDNESS

By JOHN H. HRUSKA

Metallurgical Engineer, Electro-Motive Corp.



EQUIPMENT used for making hot hardness determinations by means of a hot Carboloy ball. Photo courtesy of W. A. Wissler, Union Carbon & Carbide Research Laboratory, Inc.



ABOUT 12 years ago, H. P. Holnagel advanced a new conception of mechanical hardness of technical matter and its significance for modern metallurgical testing. The original paper describing the results of these fundamental researches appeared under the title "Hardness Numbers and Their Relations", in *THE IRON AGE*, 1925, pages 770 to 773. In principle, Holnagel's observations established the similarity between the well-known stress-strain curves of the tensile test and the graphical relationship of pressure and corresponding depth of pene-

tration in the indentation hardness tests. The familiar elastic limit, permanent yield and ultimate strengths, followed by flow may thus be visualized in the diagrammatic representations of either elastic or deformative hardness testing. See Fig. 1.

Recent advancements in measuring hardness more accurately than heretofore possible prompted the writer to broaden the scope of these comparative studies also over the technically important temperature ranges of specific metals and alloys. Modern developments in the operation of machinery, tools and equipment at unavoidably higher temperatures than ordinarily experienced a few decades ago, have been of such magnitude as to impose increasing requirements upon testing technique in regard to the doubtlessly important indices of resistance to permanent compressive deformation. The following deliberation may perhaps serve well as an illustration of this statement: It has long been known, that tensile strength together with elastic or indentation hardness generally decrease at higher temperatures. Quite exhaustive work was done by numerous investigators and metallurgical laboratories computing useful tabulations and diagrams especially for such metals which are

subject to mechanically produced or directly convected heat. High speed steels of the conventional 18-4-1 type and many similar grades of tool steels have received particular attention in the endeavor to correlate measurable service performance with that property designated presently as "hot hardness", i.e., the variation of rebound or indentation hardness with temperature, as shown in Fig. 2.

This work with highly alloyed tool steels, the scant published data on other metals, in addition to the author's experiments, were scrutinized in the present article with a view to establishing some diagrammatic or mathematically expressible equations for the future simplification of similar studies on hot hardness.

Types of Tests

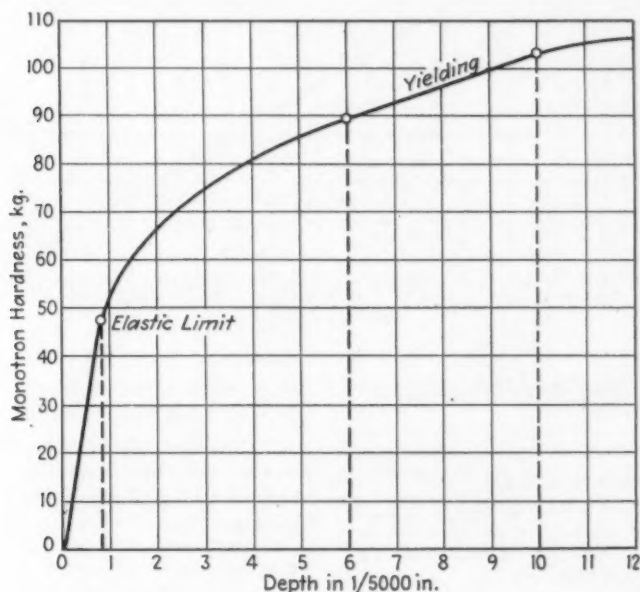
Hardness at elevated temperatures and more accurate methods of its testing have engaged the interest of many investigators, especially since the discovery of high speed steels by Taylor and White. Thus, it was only logical that the first attempts to measure hot hardness were made after the introduction of the ball indentation test by J. A. Brinell. The development of nearly every instrument intended for static or dynamic

hardness testing was similarly accompanied by some experimentation in the field of higher temperatures. It is interesting to note, however, that practically all of the early research work along these lines was handicapped by some discrepancy of the testing apparatus or parts thereof, necessitating abandonment of that method for the intended purpose.

The rapid advancement in the production of highly heat resisting metals together with the steadily improving accuracies of essential testing apparatus during the last decade suggested numer-

objection of a difference in temperature between the ball and specimen. The "cold ball" method, however, is considered by many as the most practical of all hot hardness tests.

In order to minimize the area of the chilling effects of the 10 mm. Brinell ball during the 30 sec. required for a standard Brinell test, the present writer used a $\frac{1}{8}$ -in. ball of tungsten carbide in conjunction with a standard Rockwell testing apparatus and under a 60 or 100 kg. load, with truly gratifying results. Duplicate tests show satisfactory agreement.



ous renewed efforts to correlate the anticipated changes of hardness with increasing temperatures. Hence, inconsistencies derived from the known softening of steel balls during the conventional 30-sec. contact with the hot metal—as practiced during the Brinell test—focused attention of metallurgists upon the application of tungsten, and other thermally stable carbides, as possible ball materials. Table I gives comparative data for three different types of balls. Note the different limits in temperature for each type, and, also, the variation in flattening of the balls at various Brinell hardness numbers.

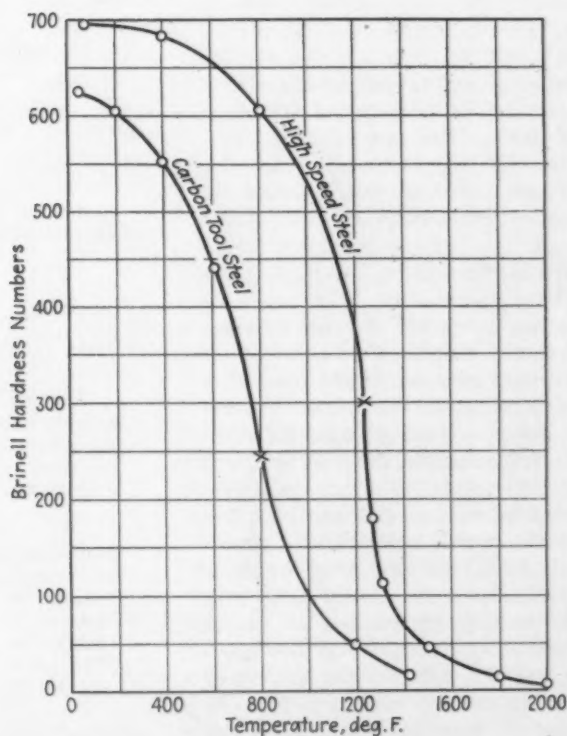
Consequently, 10 and 5 mm. balls of the newly discovered materials were used in standard Brinell machines. Highly informative tests were conducted in this manner with either a cold ball pressed into the hot metal or with the impresser held at the temperature desired for the test piece, thus eliminating the

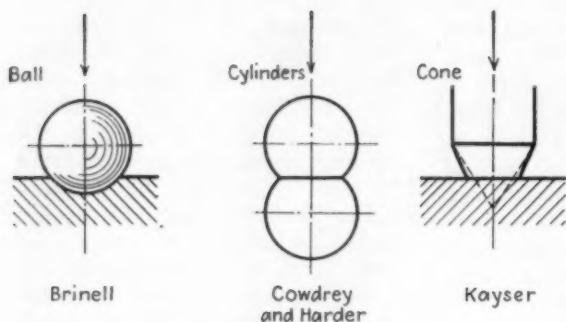
It has also been found by reviewing available reports and by actual experimentation, that hardness tests with carbide balls are by far more consistent and are naturally less expensive than most of the indentation hardness tests utilizing diamond pyramids or diamond balls. The latter objection apparently eliminated a broader use of these tests for investigation of hardness characteristics of metals at higher temperatures. In making the tests with a Rockwell apparatus, the top and bottom surfaces of the specimen should be smoother than in ordinary shop testing. It will be shown later that the tests carried out by means of this method are readily convertible into Brinell numerals, enabling a more comprehensive discussion of conclusions.

The apparent objection of the above indicated ball indentation test pointed towards the application of a modified compression test, based on the surface deformation caused by pressing two specimens of the tested material against one another. Ever since the conception of the mutual indentation method of measuring hardness of metals in 1722, by Réaumur, there have been made various attempts to apply this principle also for the measurement of hot hardness. Haigh, Foepl, Cowdrey, Kayser, and Harder have used this test in carrying out specific research pro-

ABOVE
FIG. 1—Hardness stress-strain diagram for eutectoid tool steel (monoteron tests).

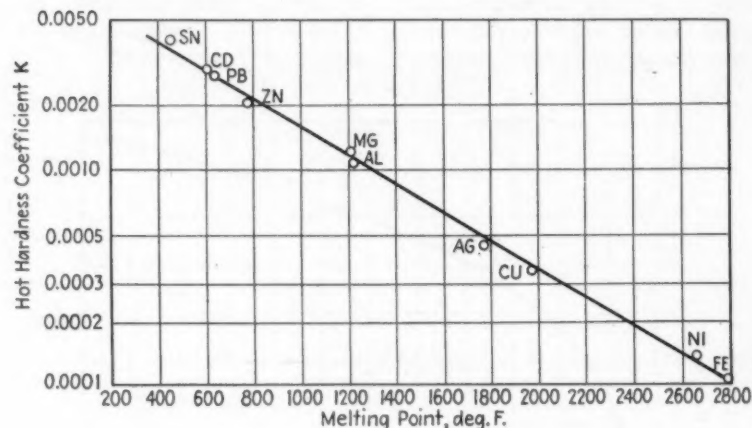
AT RIGHT
FIG. 2—Hot hardness curves for high speed and carbon tool steel.





AT LEFT
FIG. 3—Various schemes used in determining hot hardness.

BELOW
FIG. 4—Graphical (logarithmic) relationship between hot hardness coefficients and melting points of various pure metals.



grams. While scientifically more appealing, the Cowdrey and Harder tests average only 0.9 per cent above those of the corresponding Brinell or even Rockwell tests with carbide indentors. Kayser's tests utilizing a pyramid pressed against the underlying support, show about the same spread as those of Cowdrey and Harder, but the average of the resultant numerals is several per cent higher than the conventional Brinell determinations. Sketches indicating how these various methods function are shown in Fig. 3. In justice to other procedures, it must be said that the orthodox Brinell tests probably have the same practical magnitude as any one of the mutual indentations.

Several Tests Necessary

Very recent work of the writer on conversions of various hardness numerals seems to indicate the necessity to ascertain hot hardness by more than one type of testing in order to give a truly reliable index of the investigated material for practical purposes. The method of testing depends upon the purpose for which the information is sought. If the part is used at higher temperatures under static load, the ball or mutual indentation test is entirely satisfactory for giving the desired information as to hot hardness. On the contrary, material subjected to repeated or dynamic stresses should invariably be investigated by means of some dynamic method of test. In principle, dynamic methods of hardness testing are based on the measurement of surface deformations, i.e., by the elastic rebound of a physical shock, the energy of which is ordinarily well standardized with the testing instrument or procedure. The fundamental law governing the deformative testing of hot hardness by means of dynamic methods may be derived from the

following mathematical deliberation:

$$E = a \cdot d^n$$

$$\log E = \log a + n \log d$$

E equals the energy of the fall; a is the material constant; d is the diameter of spherical impression (if ball is used); and n is a constant.

The above equation may, of course, be expressed graphically on logarithmic paper. Straight lines should result for ideal conditions of testing. Various experiments made with the Poldi, Pellin and Oertel Hardness Testers disclosed the interesting fact that the expo-

nent "n" is practically constant for any type of tested material. It was also found by exhaustive tests that "n" equals 4. For an alloy having a material constant or hardness indentation (numeral) of H:

$$E = H \cdot d^4$$

$$H = \frac{E}{d^4}$$

The specific relationship between the energy E and the surface S of the spherical indentation when

using a standard Brinell ball for the test is indirectly indicative of the resultant hardness numeral known as the dynamic Brinell hardness; it is given in the following deductions:

$$S = \frac{d^2 \pi}{4}$$

$$d^2 = \frac{4S}{\pi}$$

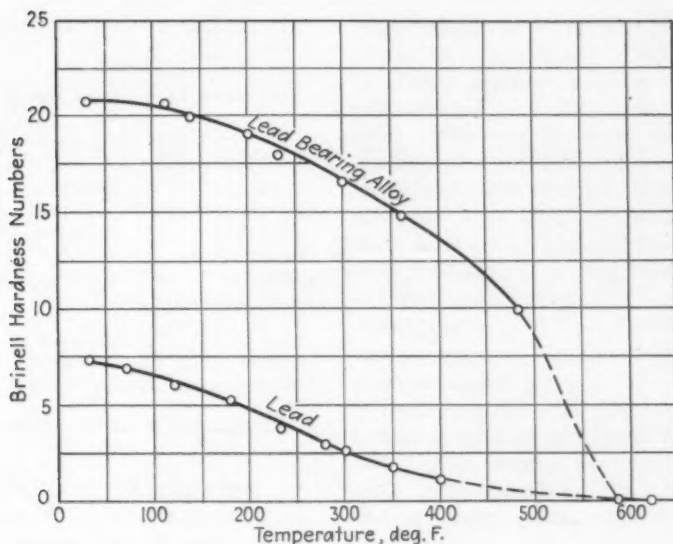
$$d^4 = \frac{S^2}{0.6169}$$

$$H = \frac{0.6169(a)}{S^2}$$

When scrutinizing printed and privately secured diagrams on the

TABLE I
Comparison of Brinell Balls Used for Hot Hardness Tests

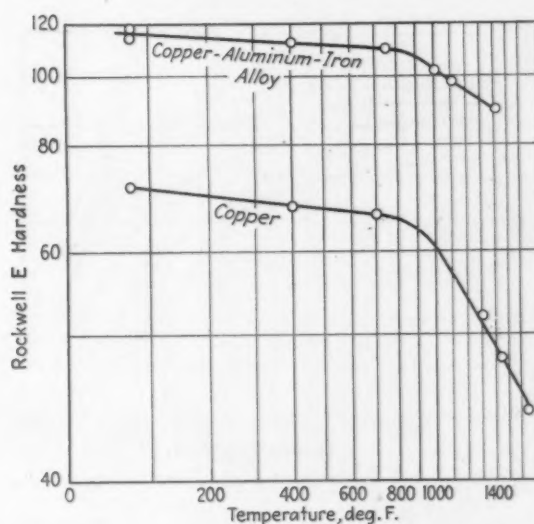
Type of Ball	Carboloy Ball	Hultgren Cold Worked and Etched Ball	Ordinary Steel Ball
Diameter of ball, mm.	9.998	9.998	9.996
Diameter of ball, in.	0.3938	0.3938	0.3939
Weight of ball, gm.	7.7417	4.3084	4.1161
Composition of ball metal, per cent	80 tungsten 11 carbon 9 cobalt	1.20 carbon	1.10 C
Elastic rebound, per cent	87.0	86.3	82.8
Safe temperature limit, deg. F.	1650	400	400
Flattening of ball (in mm.) at:			
400 B.H.N.	0.000	0.000	0.004
500 B.H.N.	0.000	0.001	0.009
600 B.H.N.	0.002	0.005	0.020
700 B.H.N.	0.004	0.012	0.036



ABOVE
FIG. 5—Hot hardness curves of lead and complex lead alloy.

o o o

AT RIGHT
FIG. 6—Hot hardness curves (logarithmic) of copper and complex copper alloy.



relationship of hot hardness and temperature in regard to their geometrical configurations, it may be inferred with ample justification, that nearly all hot hardness curves of metals correspond to a clearly uniform pattern. The exact curvatures and slopes will, of course, show deviations according to the type and composition of the steel tested, but—in general—they are geometrically similar. This is true irrespective of the method used in securing the essential data for a reliable hot hardness curve.

Within the rather narrow limit of -50 deg. C. to about $+200$ deg. C., the mechanical hardness of very pure metals changes with varying temperatures in accordance to a simple logarithmic curve, the mathematical expression of which reads as follows:

$$\log H_2 - \log H_1 = k (t_2 - t_1),$$

where H_2 is the hardness numeral at t_2 ;

H_1 is the hardness numeral at t_1 ; t_2 and t_1 are temperature readings; and k is the coefficient equivalent to tangens of inclination of the curve.

The hardness numerals should preferably be expressed in Vickers or Brinell units, the temperatures

should be measured or converted to Centigrade degrees. Physically speaking, the essential coefficient k seems to be a direct derivative or at least in close agreement with the melting point of the metal under consideration. Fig. 4 represents this relationship graphically, and Table II lists the actual melting points and coefficients (k) for most of the more common industrial metals.

Since ferrous or non-ferrous alloys are characterized by a melting range and not by a clearly defined melting point, this undoubtedly convenient rule may not be applied to commercial metals without ample corrections. These

corrections become so complicated, however, as to obscure the simple correlation mentioned before. A rather exhaustive series of tests conducted by the author with many of the important metals used by the industries made, therefore, an entirely different mathematical treatment of technical hot hardness curves advisable.

Complete hot hardness curves of carbon and alloy steels as well as of numerous non-ferrous alloys resemble the one in Fig. 2 representing ordinary high speed steel of the 18-4-1 type. It may be observed that during the first few hundred degrees of increasing temperature the hardness decreased rather slowly. From about 500 deg. C., or 932 deg. F., the hot hardness drops abruptly to less than 100 Brinell hardness numerals. At still higher temperatures, this low hardness diminishes continuously, until its value reaches zero when melting commences. Mathematical analyses of these

TABLE II

Hot Hardness Coefficients and Melting Points of Various Chemically Pure Metals

Metal	Hot Hardness Coefficient, k	Melting Point in		
		Deg. C.	Absolute Temperature	Deg. F.
Aluminum	0.00110	660.0	933.0	1200
Cadmium	0.00295	320.9	593.9	609
Copper	0.00035	1083.0	1356.0	1981
Iron	0.00011	1535.0	1808.0	2795
Lead	0.00280	327.5	600.5	622
Magnesium	0.00120	651.0	924.0	1204
Nickel	0.00014	1452.1	1725.1	2646
Silver	0.00045	960.5	1233.5	1761
Tin	0.00410	231.8	504.8	449
Zinc	0.00210	419.4	692.4	787

curves are being conducted at present, the results of which work shall be reported upon their completion, in the near future.

Preliminary examinations of hot hardness curves revealed, however, one interesting phenomenon in common with all metals or alloys under consideration. All curves computed on ordinary graph paper showed a geometrically definable turning point between the concave and the convex portions of the curves. To the writer's knowledge very little attention has ever been paid to this peculiarity of hot hardness curves and yet, it seems, that this turning point is a distinct criterion for various compositions

is quite evident from these curves, that the logarithmic relationship exists up to a "turning point" at about 200 to 300 deg. F. below the melting point of the alloy. This confirms the writer's previous assertion that alloys with changes of phase in the solid state or with melting intervals, do not follow the otherwise simple logarithmic correlation of hardness and temperature above a definite temperature.

Another similar example of the effects of alloying elements upon the geometrical configuration of hot hardness curves may be found when studying copper alloys. The changes of hot hardness of electrolytic (chemically pure) copper

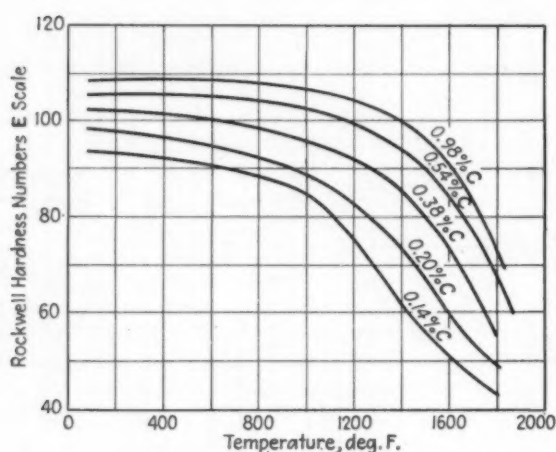


FIG. 7—Hot hardness curves of commercial iron-carbon alloys.

and masses of ferrous and non-ferrous metals. Comparisons within the technically used groups of alloys, such as the one shown in Fig. 2, would certainly prove this contention.

Hot Hardness of Metals and Alloys

While it has been shown in the foregoing discussion that chemically pure metals are governed by a logarithmic relationship between hardness and corresponding temperatures, the question arises now whether the influences of relatively small additions or impurities have a marked influence upon the general trend of their hot hardness curve.

In order to demonstrate this difference the hot hardness curves of the purest obtainable lead was compared with a modern bearing alloy containing several other ingredients in addition to the lead base. The analyses of both specimens are shown in Table III.

The resulting hot hardness values were then plotted on diagrammatic paper (See Fig. 5). It

corresponds up to about 1120 deg. F. to the following equation:

$$\log H_2 - \log H_1 = 0.00035 (t_2 - t_1)$$

Above this temperature proportional permanent yield and flow modify the trend of the hot hardness curves to one of the convex type. This property remains something like a criterion of all alloys containing copper. A comparison with a rather complex copper-aluminum-iron alloy will prove

TABLE III
Analyses of Pure Lead and of Bearing Alloy

	Chemically Pure Lead, Per Cent	Bearing Alloy, Per Cent
Lead	99.992	98.29
Copper	trace	0.18
Tin	nil	0.94
Calcium	nil	0.06
Aluminum	nil	0.07
Bismuth	0.004	...
Antimony	0.003	...
Not determined	0.001	0.46

TABLE IV
Analyses of Pure Copper and a Complex Alloy

	Electrolytic Copper, Per Cent	Aluminum- Iron- Copper Alloy, Per Cent
Copper	99.990	88.46
Aluminum	trace	7.59
Iron	0.001	3.61
Nickel	0.002	0.08
Lead	trace	...
Sulphur	0.003	...
Not determined	0.004	0.26

the existence of this rather peculiar finding. Table IV gives the composition of the copper and of the alloy used in this investigation.

The hot hardness curves of both metals depicted in Fig. 6 are self-explanatory.

The importance of a distinct turning point of hot hardness curves becomes still more apparent in the behavior of ferrous alloys or metals. Vacuum melted electrolytic iron, for example, is marked by the following equation:

$$\log H_2 - H_1 = 0.00018 (t_2 - t_1)$$

This admittedly simple expression becomes rather obscure by the intentional addition of such metallurgically common elements as carbon, manganese, silicon, nickel, chrome, etc. Although it was outside of the intended scope of this paper to study the effects of each of the possible combinations of the various elementary or alloying constituents in technical iron or steel, nevertheless, the influence of carbon upon the relative outline of the corresponding hot hardness curves of ordinary steels should be of interest in any discussion relative to hot hardness. Fig. 7 illustrates graphically the changes of Rockwell hardness—determined by means of a 1/8-in. carbide ball at 100 kg. load—with temperatures up to 1900 deg. F. It should naturally be pointed out that generally applicable conclusions should not be drawn from these diagrams, since they do not represent but tests with commercially produced steel and not vacuum melted alloys of the theoretical carbon-iron alloys. However, the relative values are probably not displaced for ordinary open-hearth grades with analyses close to those of the employed specimens.

Simplified Alloying for

Wear and Corrosion Resistance

By MILES C. SMITH



TO be able to convert ordinary cast iron, mild steel, or even copper into a wear-resisting, corrosion-resisting alloy that will meet present-day requirements sounds very much like a worthwhile achievement. To be able to do it easily, and relatively cheaply, in almost any sort of a metal melting arrangement adds to the importance of the process, and, while further developments and greater perfection of procedure are in the offing, enough ground has been gained by this new method of alloying to demand the interest of every metal maker and machinery fabricator.

Wear and corrosion-resisting metals aren't a new objective. Metallurgists have already gone a long way in their development and many usable metallic alloys for such services are on the market and in use. For the most part, though, they are quite complex alloys which possess out of the ordinary physical properties that hamper their more general adoption. The metals resulting from this newest alloying procedure have a quite simple composition and the base metals retain most of their original physical characteristics, at least, in so far as behavior through temperature changes is concerned, yet they take on the added qualities necessary for longer useful life in severe service.

According to popular conception, wear reduces the size and weight of a body by rubbing off particles

BORIDE crystals have been formed into a "mother" with various percentages of pure electrolytic nickel. The author herein describes the introduction of this "mother" into baths of molten cast iron, steel, copper, etc., which procedure results in greatly increasing the corrosion and wear resistance of the base metal.

while it is in sliding frictional contact with another body. More often than not machinery and equipment users fail to recognize the presence of any destructive agency other than pure abrasion and hold to the theory that glass-like hardness, especially upon the surfaces of contacting metallic parts, should be and is the acme of wear-resistance preparation.

In no sense of the word is this a true conception of either wear itself or wear-resistance. If there should be no other corroding, eroding or similar damaging and destructive agencies present, oxidation and galling must be reckoned with. Rarely, except in very carefully prepared apparatus, is it possible to have abrasion without it's being accompanied by at least one of the several other metal destroying agencies. Consequently, when it is planned to resist the ravages of abrasive wear, there should also be preparation against the ravages of corrosion, erosion, electrolysis,

galling and oxidation. By this recently developed method of alloying, described in following paragraphs, all these factors are taken into account.

Much has already been said about the metallic boride crystals which were invented some five years ago by Norman W. Cole, a Pacific Coast metallurgist who has specialized in so-called hard metal developments since their inception. There have also been discussions on the fact that these crystals, as produced by Mr. Cole's process, consist of a mixture of extremely high melting point metallic boride crystals and boride crystals of a much lower melting point, which mixture will readily alloy with practically any base metal except aluminum, lead, zinc and copper. But the scheme of forming these crystals into a mother with various percentages of pure electrolytic nickel and introduce this mother into baths of molten cast iron, steel and copper is quite new. It is this latter process which is now available for practically anyone's adoption, and which produces simple and useful alloys with most interesting characteristics.

Again contradicting the popular conception of the ideal wear-resisting metal, the best alloy for such service is one which needs not have any great degree of hardness, either upon the surface or throughout its entire body, but it must possess a density and molecular cohesion that will resist the rubbing off or tearing away of one or more

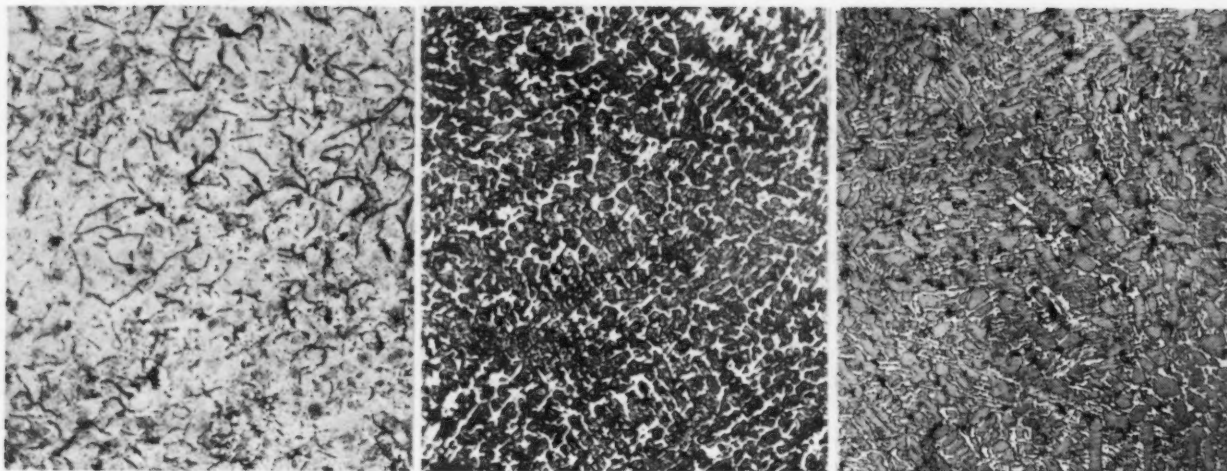


FIG. 1—From left to right: Pure gray cast iron, cast iron and 5 per cent mother (boride crystals and nickel), cast iron and 25 per cent mother. All views at 100 diameters.

particles from the whole piece. In other words, it should be tough. If it could be resilient, so much the better. Surface density or so-called "work hardening" is also beneficial for wear resistance, and pronounced resistance to corrosion and oxidation are all-essential. And, along with it all, it should induce a low frictional coefficient.

Today, there are three major processes for securing wear and corrosion resistance: heat treating, hard facing, and compounding or alloying. All three methods have their good and their bad points, their records of achievement and failure, their ideal applications and the services for which they are entirely unsuited. Years have been spent and years will be spent in an effort to determine and classify abrasive and corrosive agencies and the ways to best combat them, but it is very doubtful if they ever can be accurately handled by any "rule of thumb." Yesterday, today and, undoubtedly, tomorrow, experimenters will go on trying this and trying that with no definite guarantee beforehand that they will be 100 per cent successful.

Heat treatment, unless the metal heat treated be non-oxidizing and corrosion-resistant, can hardly be considered as a satisfactory preparation process to resist severe wear. In applications where the service is relatively light and where lubrication cuts down the possibility of galling, oxidation or corrosive action, as well as wear, either surface preparation or heat treatment throughout the piece will lengthen its useful life. For more severe service, heat treatment

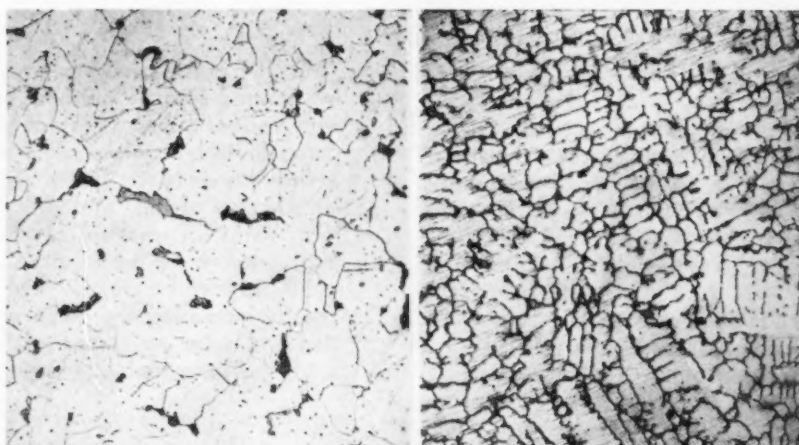


FIG. 2—Mild low-carbon steel (left), and (right) mild steel and 25 per cent mother (boride crystals and nickel). Both views at 100 diameters.

is far from completely satisfactory.

On the other hand, hard facing produces an entirely different kind of surface protection than heat treating, and it can resist corrosive as well as abrasive agencies. However, hard facing also has its limitations as well as its ideal applications. Most often, though, the failures of hard facing are caused by something other than failure of the hard facing metal itself. The welding on of a protective pad or layer of wear-resistant, corrosion-resistant alloy often sponsors trouble and failures in the parent metal or the hard faced assembly which discourage a wider use of the process.

The ideal way to resist wear and corrosion is, of course, solid metal which possesses all of the desired characteristics. In other words, a wear and corrosion resistant alloy that is easy to produce, not pro-

hibitive in cost and which can be readily worked up into the shapes desired and required. These new easily compounded alloys may not have every desired property, yet there is every reason to believe that they come nearer to the objective than any metals so far introduced.

Colmonoy, Inc., of Los Nietos, Cal., produces Mr. Cole's developments commercially, and alloys the metallic boride crystals and pure electrolytic nickel in varying proportions from 7½ per cent nickel and the balance crystals, to 80 per cent nickel and 20 per cent crystals. It is the latter analysis which has been found most suitable for the mother or alloying substance. This mother has a melting point of approximately 1850 deg. F., but, since it contains no easily oxidized or gassed elements, can be superheated to far above its normal melting point without any loss of

properties or change in chemical content. By fusing this mother in varying percentages with steel, cast iron or copper, alloys with most interesting physical and chemical characteristics may be obtained. Furthermore, the percentages of the base metal and the mother may be varied to meet individual needs of each type of service.

In order to better bring out the possibilities and effectiveness of this new alloying procedure, it is pertinent to draw a few comparisons and study the various resultant metals over a range of percentages of base metals and alloying mother. Rockwell hardness readings will be used to show

phuric acid solution is decreased to 1.07 per cent. By raising the mother percentage to 25, the Rockwell hardness drops another point but the loss in the acid solution is only 0.32 per cent. These alloys, in contrast to the one made with the pure crystals, are tough, with a very dense structure, and resist fracture.

Mild or low-carbon steel, when alloyed with the nickel crystal mother in the percentage of 75 steel and 25 mother, becomes a metal which has a Rockwell C hardness of 6 and a 100-hr. loss in the sulphuric acid solution of 0.53 per cent. If the same mild steel be alloyed with the pure crystals in the same proportions as the cast

tack is very noticeable. When 10 per cent of the mother is added, the hardness jumps up to 80 Rockwell B scale and, with 25 per cent mother, the B scale hardness becomes 94 or 25 Rockwell C scale.

To give a better idea of the structural changes made when this alloying mother is added to copper, the 1 per cent mother alloy shows an ultimate strength of 27,110 lb. per sq. in. with a reduction of area of 47.5 per cent. The 10 per cent alloy has an ultimate strength of 43,000 lb. per sq. in. and a deduction of area of only 8.4 per cent.

Resorting to the microscope, which, after all is said and done, tells the true story, it becomes evident that some most interesting crystalline structural changes take place in the base metal when the nickel-metallic boride crystal mother is added. Taking cast iron first and examining the pure cast iron, then the cast iron alloyed with 5 per cent mother and next with 25 per cent mother, it is noticed that there is a change in structure that progresses as the percentage of mother is increased (see Fig. 1). The cast iron shows a relatively loose grained crystalline structure which, with the addition of only 5 per cent mother, closes up very noticeably. The structure of the 75 per cent cast iron and 25 per cent mother indicates a dense, greatly refined metal that would be expected to perform as it actually does.

Steel—mild low-carbon steel—shows a similar change in crystalline structure with the addition of

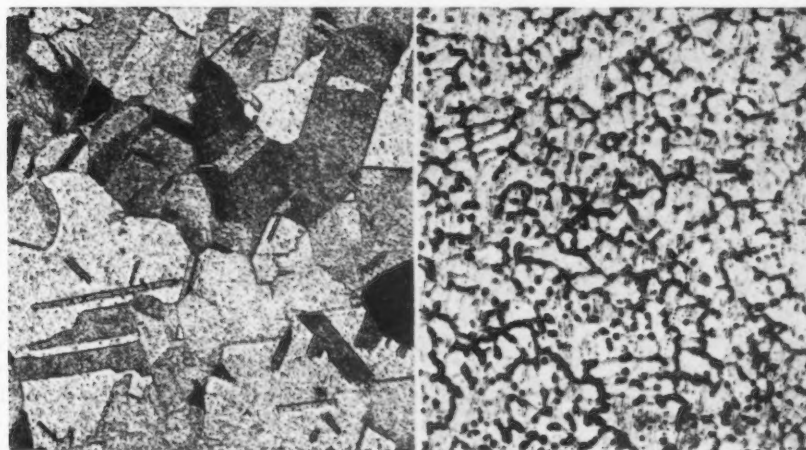


FIG. 3—(Left) Section through pure copper trolley wire, at 95 diameters. Pure copper and 10 per cent mother at 100 diameters (right).

changes in density, and the percentage in loss of weight when submerged in one part sulphuric acid and four parts water for 100 hr. will be used to indicate the change in corrosion resistance.

Ordinary cast iron, if alloyed with 8 per cent by weight of the pure metallic boride crystals produced by Mr. Cole, will form a metal that has a Rockwell C hardness of 62, a density of 7.55 and a 100-hr. loss in 8.09 per cent sulphuric acid solution. This metal is very brittle and is entirely unsuited for use as a machine part.

Should 5 per cent by weight of the nickel-crystal mother be added to the same ordinary cast iron, the Rockwell C hardness will be 56 and the 100-hr. loss in the acid solution will be 65.91 per cent. However, if the percentage of mother is increased to 15 per cent, the hardness is decreased to 29 Rockwell C and the 100-hr. loss in the sul-

phuric acid solution is decreased to 1.07 per cent. By raising the mother percentage to 25, the Rockwell hardness drops another point but the loss in the acid solution is only 0.32 per cent. These alloys, in contrast to the one made with the pure crystals, are tough, with a very dense structure, and resist fracture.

Copper takes on some most interesting physical characteristics when alloyed with the nickel crystal mother. Only 1 per cent of the mother, added to pure electrolytic copper, increases the density of the copper alloy from 5 to 7 per cent over that of pure copper, and the increased resistance to acid at-

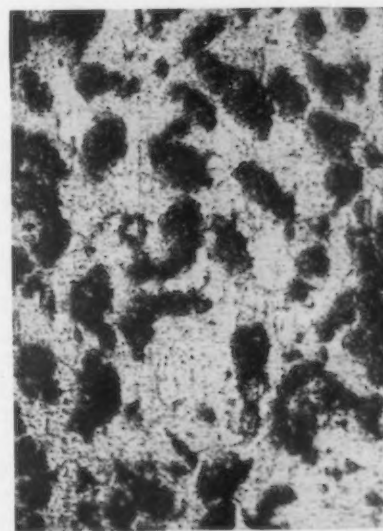


FIG. 4—Nickel-boride crystal mother, at 400 diameters. Note the very dense structure.

the alloying mother. The refinement and regularity of the crystals indicates (see Fig. 2), as in the case of the cast iron, that the resultant alloy of 75 per cent steel and 25 per cent metallic boride crystal-nickel mother will be tough, wear-resistant and corrosion-resistant.

It is in the case of copper, however, where the crystalline change is even more marked. Comparing the magnified cross-section of a pure copper trolley wire and the photomicrograph of the same pure copper after being alloyed with 10 per cent of the mother shows so marked a change in structure that the two have little resemblance (see Fig. 3). The large crystals of the pure copper have been re-

two distinct kinds. Part of the crystals of the crystalline mixture readily alloys with the nickel of the mother and, in turn, with the cast iron, steel or copper base metal used and impart to that alloy all of the desirable properties incident with the addition of boron or borides to base metal alloys.

In addition to the refining influence, the alloy is reinforced by a generous well distributed quantity of metallic boride crystals which do not lose their identity and alloy, but which percolate through the mass and are held as in an emulsion. These indestructible metallic boride crystals, formed by the heat of chemical reaction, are microscopic in size, diamond hard and well imbedded in the mass it-

average hardness of 54 to 56 Rockwell C scale and a 100-hr. loss in 4:1 sulphuric acid of 0.06 per cent. It is relatively tough to break and exceedingly hard to grind. It may be seen from this that the nickel loses to a considerable degree its characteristic physical properties by this close association with the crystals. A photomicrograph of the nickel-boride crystal mother is shown in Fig. 4.

Quite naturally, any new substance or metal is of no more value than the possible extent of its useful employment, and the same is true of these new simple alloys. Laboratory metals are interesting, but of no commercial importance. The first claim of the new alloys is the possibility of their production in any metal making plant. They are not suitable for cupola production, but any type of crucible melting arrangement is entirely satisfactory.

Furthermore, they may be varied in analysis to meet the conditions at hand. There are no delicate metallurgical balances to be maintained and the percentages of mother and base metal may be changed or varied at will to meet the requirements. For example, one present user of the new copper alloys melts the mother and pure copper in 50:50 proportion first and uses small pigs of this manufactured alloy to feed into his pure copper to form the desired final analysis. Melting and remelting, providing impurities are kept out, has little, if any, damaging effect on the mother or its alloys.

In this day and age, when the addition of alloying elements in great numbers appears to be the vogue, it would seem that the introduction of so very simple compositions would be getting out of step with the times, but actual performance data on the new alloys prove their advantages rather than disadvantages. Present-day industry is requiring more and more equipment and at the same time demanding a considerable increase in the length of the equipment's useful life. The new alloys have opened up avenues for attaining industry's demands and have shown many fabricators how to help themselves out of their own difficulties instead of being entirely at the mercy of specialized metal producers.

A NEW OVERLAY MATERIAL

COLMONOY, INC., Los Nietos, Cal., manufacturers of alloy and overlay metals, has announced a new process and material for producing a welded-on,



wear-resistant, heat-resistant, corrosion-resistant overlay or hard facing.

This new material consists of a (metallic boride) paste contained in collapsible tin tubes, as illustrated. This paste may be squeezed out and spread over the surface to be processed and then sweat into the surface of the parent metal with the flame of the oxy-acetylene torch, the atomic hydrogen torch, the carbon electric arc, or by furnace heat, to form an overlay that actually becomes a part of the metal processed.

This sort of overlay will not chip off and it does not interfere with hot or cold forging, or forming, or heat treatment of the parent metal. The collapsible tube contains sufficient paste for processing from 1 to 2½ sq. ft. of surface, depending upon the thickness of overlay desired.

fined to such a degree that it is hard to believe the alloy has a 90 per cent pure copper base.

All of the mentioned alloys show by the crystalline structures that they are dense, with a tendency toward toughness, and, while none of them indicates any great degree of malleability or ductility, there is a suggestion of solid castings. Experience has indicated that such is the case. Any of the alloys may be cast into practically any desired shape without fear of damaging shrinks or flaws.

But a close-grained structure is not the only asset of these new alloys. As is known and as has been mentioned, the particular metallic boride crystals used with the pure nickel to form the mother are of

self. They are non-oxidizing, so have no film of oxide about them, as tungsten-carbide crystals often do, and they resist the wearing away of the metal as well as retard corrosive action. Yet, strange as it may seem, these tiny crystals reduce rather than increase both friction and a tendency to gall.

The presence of the nickel in the alloys requires no lengthy explanation to prove it beneficial. Nickel is a much used alloying element and the properties which it induces are too well known to be dwelt upon at any length here. It might be well to say, though, that the particular combination of the nickel and the metallic boride crystals used to form the mother alloy produces a metal which has an

Gas Fired Slab Heaters

By J. B. NEALEY

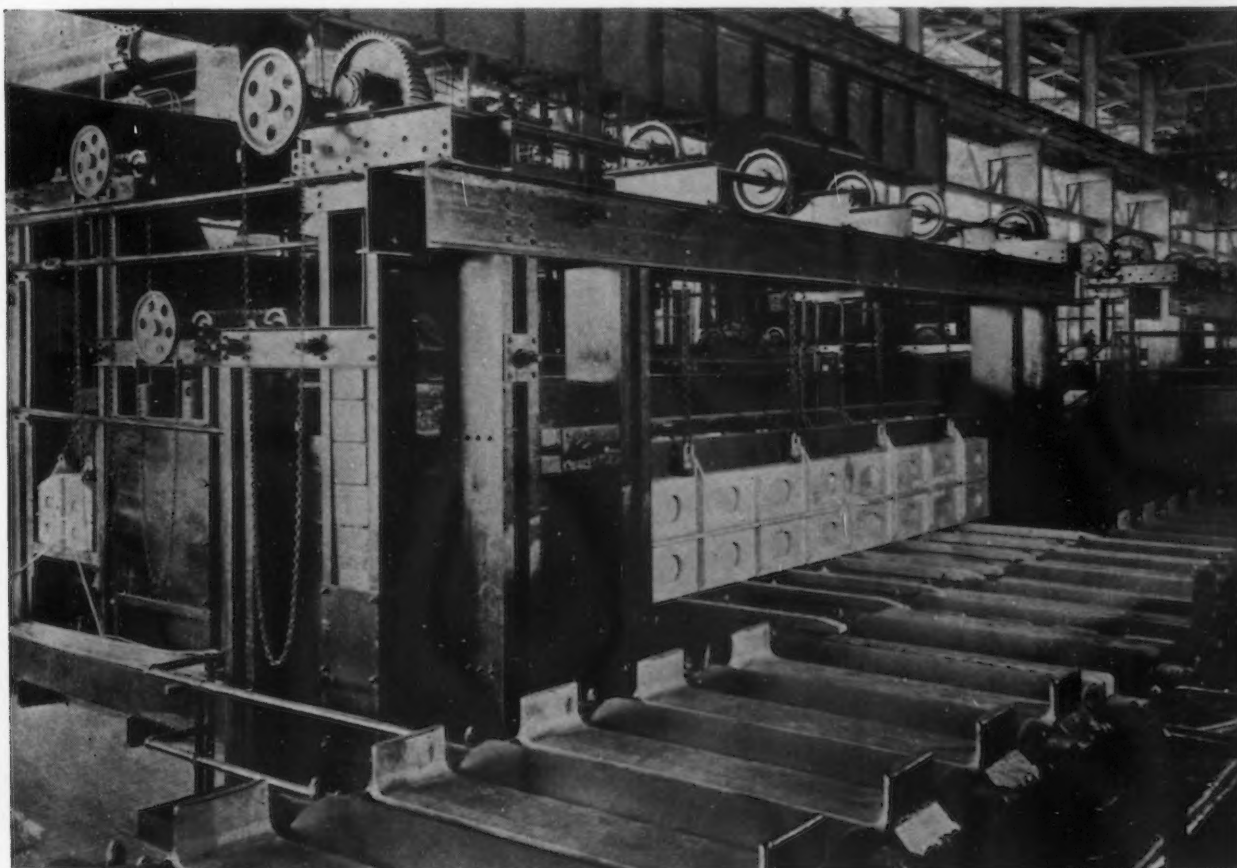
American Gas Association

TRIPLE-FIRED, zone-controlled, continuous furnaces for heating slabs are now standard equipment in steel mills and most of these utilize gas fuel. This is the type of slab heater installed in the new hot strip mill at the McDonald

works of the Carnegie-Illinois Steel Corp. In addition to the low and medium carbon steels such alloy steels as Ply-Krome, Cor-Ten, Man-Ten, low metalloid and 18-8 stainless are also rolled here.

The Ohio works of the Carnegie-

Illinois Steel Corp. supplies steel slabs up to 6¼ in. thick, 39 in. wide and 16 ft. in length. These slabs are handled by crane to a depiler, which transfers them to the furnace entry table, which is 175 ft. long and operates at a speed



GAS fired slab heating furnace similar to those at the McDonald Works of the Carnegie-Illinois Steel Corp.

of 268 ft. per min. There are three furnaces, and the slabs are charged into each by means of a ram type motor driven pusher (100-hp. motor). Zone control is obtained by the use of an independently fired heating chamber and soaking chamber.

The first section of the furnace is divided into two zones, the first long and low roofed and utilizing the waste heat from the rest of the furnace to preheat the incoming work.

Gas Burners in Three Groups

Heating is accomplished with 24 gas burners in three groups of eight each. The first group over fires the work from the discharge end into the soaking chamber. The other two groups both over and underfire the work, firing toward the discharge end. They are located at the beginning of the heating chamber, which is 6 ft. high at this point. There is no hearth here and the lower group of burners fires into a combustion chamber below the water-cooled skid pipes on which the slabs ride.

This heating chamber controls the tonnage output of the furnace, flexibility being obtained by varying the amount of gas burned. During mill delays the burners can be shut off entirely so as to save practically all of the fuel. The soaking

chamber utilizes from 15 to 20 per cent of the fuel requirements of the entire furnace and is maintained at the temperature required in the discharged material. Uniformity of heat distribution is required here. This chamber has a solid refractory hearth generally covered with chrome ore and heavily insulated beneath. The skid pipes end where the hearth begins, the slabs being pushed over the hearth where any black spots caused by the water-cooled skids are removed. The capacity of the furnace is increased by underfiring as the heat is applied to both sides of the work at the same time.

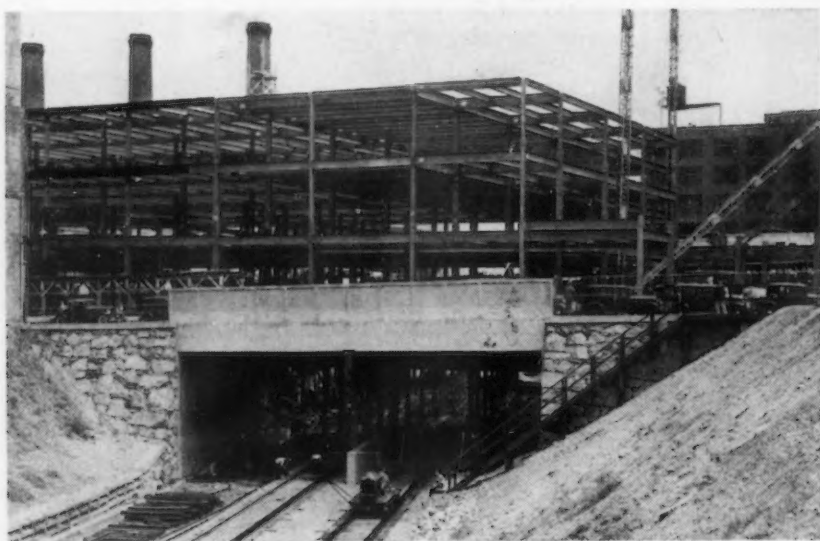
Heats 50 Tons of Steel Per Hour

End charging and end discharge are employed and the doors are motor operated to provide minimum heat losses. The hearth dimensions of each furnace are 18 x 75 ft. and the capacity is 50 gross tons of steel. Fuel consumption is approximately 1,650,000 B.t.u. per ton of steel heated per hour. A recuperator of the tubular type preheats the air for combustion. This consists of two preheating chambers with a collecting chamber between. Each preheating chamber consists of a bank of horizontal refractory tubes through which air is drawn into the collecting chamber. This air is preheated by the hot waste

products of combustion which are drawn down around them from the furnace. This preheated air is delivered by exhaust fans to the gas burners at from 2 to 2½ in. pressure and at 800 deg. F. Stack temperatures are about 1000-1100 deg. F.

While an observation pulpit is located between the pushers of two of these furnaces, each of the three furnaces has an individual control panel. On these are mounted flow and pressure meters and air fuel ratio meters. Included are a complete combustion control for each of the three zones, three indicators, indicating the gas flow to each zone, a gas pressure regulator, a furnace pressure regulator for controlling the stack damper, a recorder to record the total gas burned, a furnace pressure recorder, a CO₂ recorder and a three-point temperature recorder which records the temperatures of stack gases, preheated air and waste heat entering the recuperator. In these control panels centers the entire furnace manipulation.

Discharged onto a mill table of the roller type, the hot slabs are delivered to the first mill stand at the rate of 208 ft. per min. Entirely separate from the delivery table, and opposite the discharge door is a pair of bumpers, operating on a friction gear shaft against which the slabs impact on ejection.



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IN the reconstruction of the New York Central right of way on the West Side of New York City to remove trains from street level, the railroad tracks have been submerged and new buildings are being erected over the tracks, involving some unusual features in steel construction. The illustration shows the new plant of the Sheffield Farms Co., being built at a cost of \$2,500,000, which will take milk for New York City from milk tank cars and pump it directly into milk pasteurizing tanks in the building.

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Side-Tilter for Strip Steel Conveyors Has Longitudinal Leveling Feature

BY CARL PLOCK

Engineer, Logan Co., Louisville, Ky.

IN modern steel plants coils of strip steel are handled on their sides on trough-type roller conveyors. At intervals along the conveyor line or at the end of the line, the coils are transferred by mechanical means to picklers, uncoilers, or to storage. A simple method of transfer incorporates a tilting trough section from which the coils are discharged from one side of the conveyor.

In some cases this coil discharging is accomplished by raising the opposite side of the tilting section, thereby lifting the entire weight of the coil and swinging the entire tilting section through a substantial arc. In another arrangement, recently developed by the Logan Co. and here illustrated, one side of the trough conveyor section is held stationary and the other side is dropped just enough to cause the coils to roll off smoothly and gently. Thus the load is discharged without being lifted.

Most trough roller conveyor lines are pitched longitudinally so that the coils will travel by gravity. In

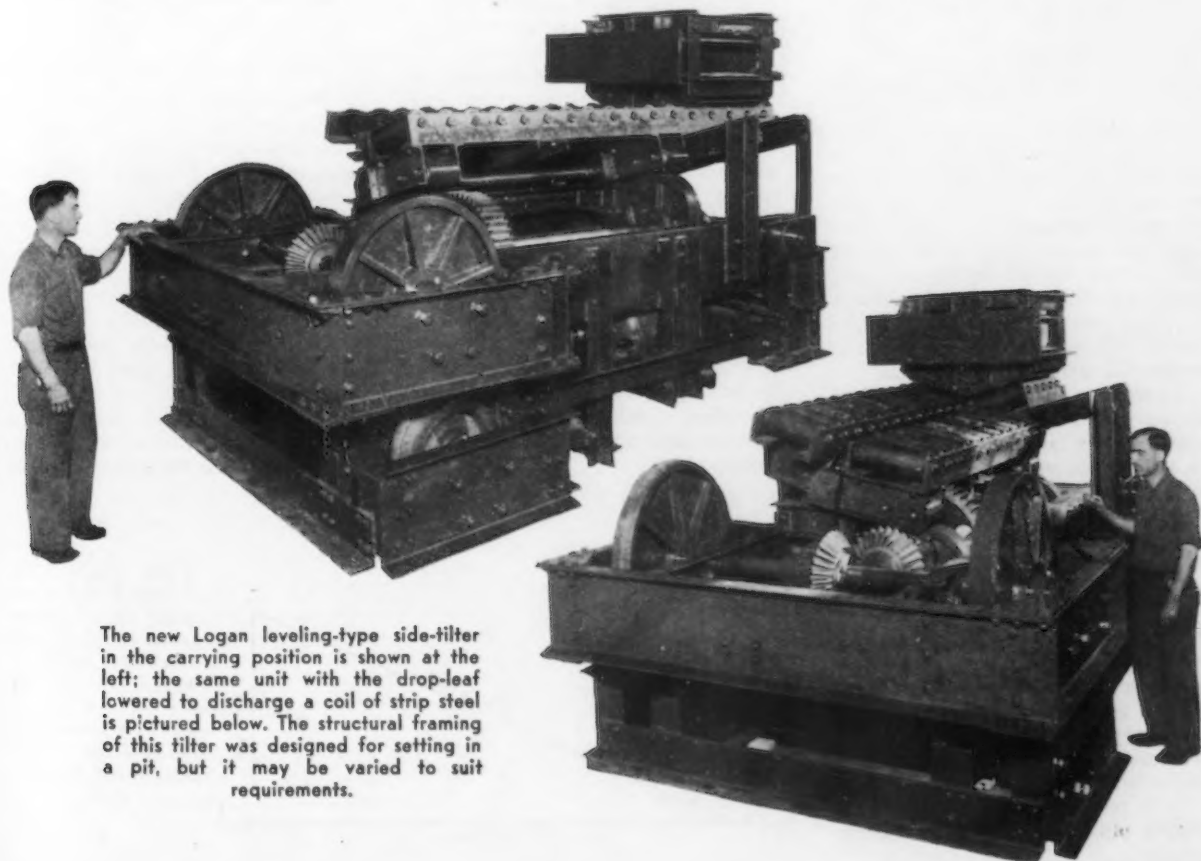
a side-tilting unit this slope may prevent the coils from discharging exactly at right angles to the main conveyor line, although right angle discharge is always to be preferred and frequently is of considerable importance. To meet this requirement, the new Logan "drop-leaf" type side-tilter has been designed to include an automatic self-leveling feature, by means of which the entire unit is lowered longitudinally to a horizontal position before the side-tilting action begins.

As shown in the illustration, the entire mechanism is pivoted on a transverse shaft at the low end and is supported positively at the high end by two leveling cams operating on flanged wheels. The side-tilting is also cam controlled. The drive, consisting of motor and speed reducer, is carried in a cradle rigidly fixed to the main moveable framework.

Operation of this leveling type side-tilter is as follows: Coils arriving at the tilting section are held in check by an escapement

type air-operated brake in the conveyor line just ahead of the tilting section, the escapement principle being used so that coils can be released one at a time. When released, the coil moves on to the tilting section and is stopped in the proper position by another brake or by an adjustable bumper plate equipped with heavy coil springs to absorb the shock. The adjustable feature provides for centering various size coils with respect to processing or handling equipment along the conveyor line.

With the coil thus in position, the operator pushes a button to start the motor, whereupon the entire tilting unit is first levelled longitudinally to horizontal. Next, and with the trough section still horizontal, the drop-leaf is lowered. When fully lowered the drop-leaf engages a limit switch which stops the machine, the coil then rolling straight off the conveyor section. This done, the operator pushes the motor-start push button again to quickly return the tilting section to its original position in the trough line, where it is stopped by another limit switch. During the entire operating cycle of the machine, for which patent applications have been made, the power unit is called upon to lift the empty tilting section only and through a very small arc; the loaded section is always lowered.



The new Logan leveling-type side-tilter in the carrying position is shown at the left; the same unit with the drop-leaf lowered to discharge a coil of strip steel is pictured below. The structural framing of this tilter was designed for setting in a pit, but it may be varied to suit requirements.

The Influence of Power Factor

CHAPTER 14 of a comprehensive series on the Economics of Industrial Power Transmission.

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IT is curious to note the very nonchalant attitude of many production executives on the subject of low power factor operation. Where power is purchased from a public utility and the utility imposes a penalty for low power factor, the question assumes serious proportions; but where no such penalty is imposed, or where the power is generated within the plant itself, the tendency in many cases seems to be to think that power factor is of no importance in the production scheme.

That attitude is probably based more on lack of knowledge than on any intentional disregard of facts. It is true that the subject is a difficult one to comprehend. Electrical engineers have not, unfortunately, made it any easier to understand, with explanations that do not really explain. But the lack of an understandable explanation does not remove the extra cost of low power factor operation, any more than the old farmer's remark on first seeing a giraffe at the circus, "There ain't no sech animal," makes the giraffe non-existent.

There is a penalty paid for low power factor operation, whether it appears on a monthly power bill, or is buried among unseen costs of operation; and that penalty is a definite—and avoidable—tax on production costs. How much that cost amounts to in the course of a year varies with many conditions. I have known cases where it came to one-quarter of the entire power cost. In any plant where power costs run into many thousands of dollars per year, the extra and unnecessary cost of low power factor operation is a factor of considerable importance.

It is possible to give a fairly simple explanation of power factor,

and it is possible to understand clearly just what its influence is on production costs in general. One does not need to be an electrical engineer to grasp the facts, because, fundamentally, the problem is one of economics, and only incidentally one of electricity. Approaching the matter from an economic viewpoint, therefore, the mystery yields to persuasion.

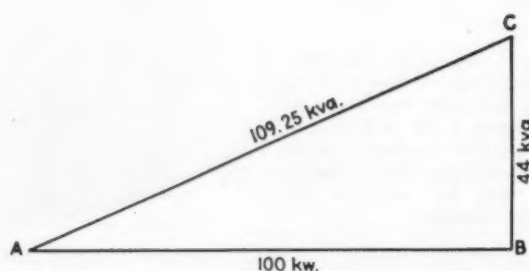
What is Power Factor?

Electricity is made to do useful work for mankind in driving machines by being transformed into mechanical energy by a motor. A motor, reduced to its simplest terms, is a machine in which electricity, flowing through coils of wire disposed in certain fashions, sets up fields of magnetic force and causes a rotating member to cut these lines of force progressively, thus making the rotating member turn on its shaft and communicate this rotating effort to the shaft of a driven machine. In a direct current motor the field and the armature windings are always electrically connected in some way. Consequently the current which "energizes" the field winding and sets up the field of magnetic force passes also through the armature winding to cause the rotational effort of cutting those lines of force. The current flows continuously through both windings, creating a magnetic field and causing the armature winding to cut the lines of that field, all in one operation. In brief, the energizing effect and the effect causing rotational effort, are one and the same, and inseparable.

An alternating current induction motor is an entirely different proposition. There is no electrical connection between the stationary and the movable parts of such a motor. The electric current flowing from the generator to the field windings of the motor (called the primary circuit) never touches the rotor. The magnetic effects in the rotor (or secondary circuit) necessary to cause rotation, are induced by the rapid reversals of current in the primary circuit windings. But the alternating current flowing from the generating source through the primary windings of an induction motor differs in one very important respect from direct current. It performs the double function of energizing the magnetic field and of inducing an entirely separate flow of current in the secondary to cause rotational, or "lines of force cutting" effect, at one and the same time, but with two separate efforts. (An electrical engineer might not agree with the wording of this statement, but I am trying to make the explanation very simple.)

One of these efforts (the lines of force cutting) is the result of the actual flow of current. It may be measured by a wattmeter and expressed in kilowatts. When you buy electricity you buy it in terms of kilowatts, or quantity of electrical flow; just as you measure gallons of water, pounds of potatoes, or tons of coal. The other effort (the magnetic field energizing) is static; it does not flow in the same sense as the other effort just described, and therefore cannot be measured in terms of kilowatts. It is a voltage, or pressure

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THE basic right-angled triangle graph of all power factor problems. AB represent voltage wave, AC current wave, and BC reactive component required for apparatus energizing purposes.

o o o

on Production Costs

By FRANCIS JURASCHEK
Consulting Editor, *The Iron Age*

effort, and electrical engineers call it the "reactive component" of the power supply. It lags behind the real power effort of the current flow. It is an actual quantity, however, and a value to express it must be added to the kilowatts of current flow to determine the value of the total amount of electricity which must be made available at the generating source for the purpose of making the motor operate. That total value of electricity supplied to the motor is spoken of as the "apparent" power which must be supplied to the motor, whereas the kilowatts of flow through the motor is spoken of as the "real" power used by the motor.

Apparent and Real Power

The apparent power which must be supplied to make the motor operate is measured by multiplying the amperes of quantity of electricity in the line by the voltage, or pressure of the electricity in the line. The measurement unit is the kilovoltampere (k. v. a.). Subtracting the value of the kilowatts of real power from the kilovoltamperes of apparent power gives an expression (in k. v. a.) of the reactive component utilized solely for the purpose of energizing the motor.

Fortunately these quantities may be visualized in a diagram of a right angled triangle. For example, assume that the real power taken

by an induction motor in a given period of time amounts to 100 kw., and that the reactive component required for energizing purposes is 44 k. v. a. Lay off on a straight horizontal line, AB equal to 100 units of length, and at B erect a perpendicular line equal to 44 units, BC. The line AC (the hypotenuse of the right angled triangle) is then a measure, to the same units, of the apparent power required to operate the motor (in this case 109.25 k. v. a.). Conversely, if it is known that the apparent power is 109.25 k. v. a., and the real power is 100 kw., the reactive component may be shown to have a value of 44 k. v. a.

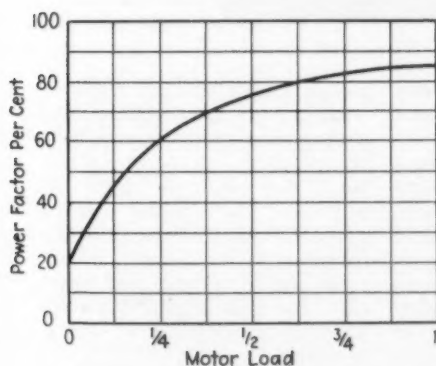
All power factor problems may be thus diagrammed, and the diagram becomes very convenient in another sense. Since reactive component is considered to lag behind the current flow, the diagram suggests that corrective measures may be used in the form of a component likewise acting at right angles to the current flow, but of the opposite value. In other words, if we can find a "leading" component to counteract the lagging component, we can make apparent power and real power coincide in value.

A simple analogy may serve to make the difference between the values of apparent power, real power and reactive component, somewhat clearer. When a man

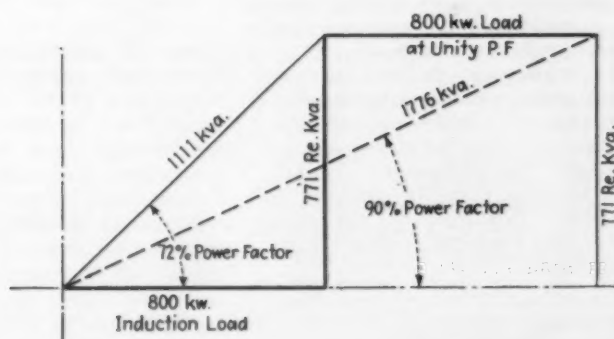
swings a golf club to hit a teed ball, the movement of his arms may be measured in terms of force, fairly simply. But in order to swing the club, he must stand on his legs, and through his legs exert force against the ground. This latter force is not so simple to evaluate in terms of the power of the swing of his club, but it is a necessary part thereof, and the two together must be combined to get a true measure of the power of the swing.

The apparent power supplied to the induction motor is like the combination of the force exerted through the man's arms directly against the ball, plus the force exerted by his legs against the ground. Real power is the swing of his arms alone, and reactive component may be visualized as the effort of standing on his legs. (In this analogy you can clearly see, too, the right-angled triangle of the power diagram.)

Now, power factor is simply the ratio of real power to apparent power. In the diagram it is 100 kw. divided by 120 k. v. a., or 83 per cent. In brief, 83 per cent of the total amount of power supplied at the motor by the generating source is used for power production purposes (the transformation of electrical to mechanical energy). Seventeen per cent is absorbed in motor energizing effects. (I have neglected here other minor effects,



A WESTINGHOUSE chart based on tests of a large number of induction motors, showing the average relation of power factor to motor load.



ADDING 800 kw. load with a unity power factor synchronous motor, to an 800 kw. induction motor load at 72 per cent power factor, raises the overall power factor to 90 per cent.

such as friction, heat dissipation, efficiency losses, etc., in order to keep the problem as simple as possible.)

Power Factor Applied

There is still another, and broader, use of the term power factor; related to the above but employed in a slightly different sense. Suppose a number of induction motors are operated on one distribution line, and that the sum of these motors, expressed in horsepower ratings and based on the load requirements of the machines they drive, is 500 hp. Suppose further that the loads on all the machines vary widely from minute to minute throughout the working day, so that the sum of the *average* working loads during the day on all the motors amounts to but 350 hp. The supply of electricity available at the generating source for all these motors must be that value of k. v. a. required to energize and operate 500 hp. of motors. Yet the actual use of current throughout the day averages that value of k. v. a. necessary to provide 350 hp. The ratio of the use of electricity to the demand requirements of the situation is also known as the power factor of operation; in this case 350 hp. divided by 500 hp., or 70 per cent.

For each of the motors in question, operating at varying loads from minute to minute, the reactive component of the power supply required to energize the primary magnetic fields is a practically constant value, whether the loads on the motors are light, requiring small values of the working current, or heavy, requiring large values of the working current. Thus, at light loads, the power factor of each individual motor is low, but when that motor is operated at full load, the individual power factor is high.

The essence of the argument is this: The use of alternating current induction motors requires the provision at the generating source of a larger supply of electricity for the operation of these motors than the motors actually consume for power production purposes. Putting this statement in terms of electrical measurements, the generator must supply a higher value of kilovoltamperes than the motors use in kilowatts. The greater the discrepancy between these two values of electricity furnished by the generator, the lower the power factor of operation.

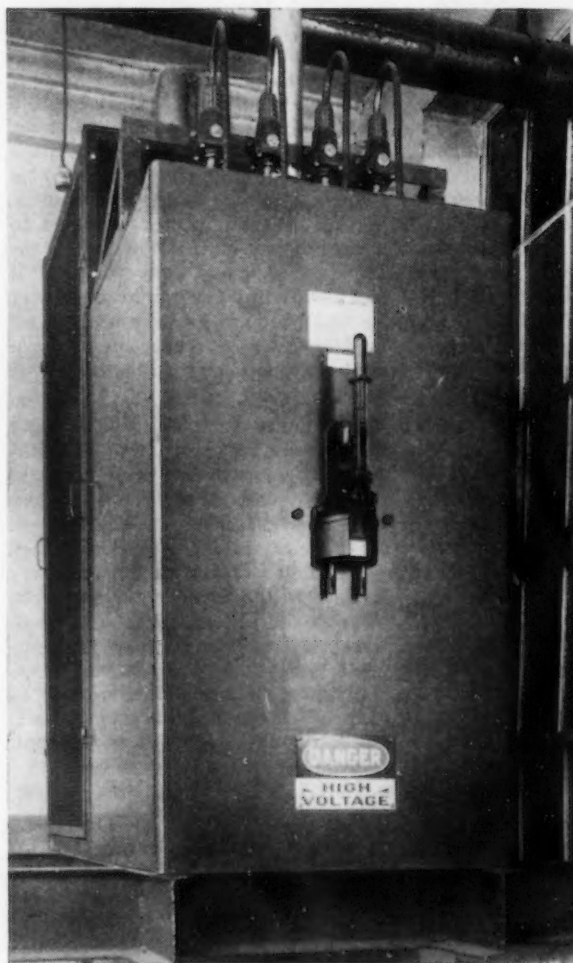
It may readily be seen, therefore, that where a utility central station sells electricity to a manufacturing plant operating at low power factor, it must provide facilities in the matter of the generation, transmis-

sion and transforming of current supply greatly in excess of the requirements of the current actually consumed for power production purposes, as recorded on a wattmeter in the plant in question. Since the utility's bills for current consumed are based on the measurements indicated periodically by the wattmeter, and since those wattmeter readings give no indication of the values of the non-working current taken for equipment energizing purposes, it is becoming quite usual for utilities to determine the power factor of plant

Whether it is a penalty that is imposed, or a bonus that is granted, the whole matter amounts to recognition of the fact that low power factor operation of the manufacturing plant costs the utility more than the wattmeter readings of current consumed for power production purposes indicate.

True in Both Cases

But if this is true for a utility selling power to a manufacturer, it is no less true, even though not so apparent, for the manufacturer who generates his own power. Low



AT LEFT

A G.E. 300 kva. capacitor at Beechnut Packing Co., Canajoharie, N. Y., cost \$5,886 installed, but improved operating conditions so much that it saved \$9,354 in the first 14 months of operation.

o o o

AT RIGHT

A WAGNER 200 hp. capacitor motor of the Fynn-Weichsel type in Waterbury Rolling Mills, Waterbury, Conn., improved power factor from 48 to 95 per cent, and does not stall at momentary loads as high as 480 hp.

operation and to add to the customer's bill a penalty based on a percentage of the kilowatt reading. This is called "power factor penalty," and is usually imposed only when the power factor is less than 80 per cent (80 per cent power factor operation being considered good). Sometimes, instead of imposing a penalty for low power factor operation (that is for operation at power factor less than 80 per cent), a bonus is granted in the shape of a lower per-kilowatt rate, for operation at 80 per cent or better power factor.

power factor operation always requires more generating capacity, greater line capacity, and increased transformer capacity, than the wattmeter readings of the current consumed for power production purposes will indicate. Consequently greater equipment investment costs are involved, and operating costs must be higher than for the equivalent operation at high power factor.

Volumes have been written on the evils of low power factor, without making much of a dent in the annually growing tribute it exacts

from industry. The reason, of course, lies in the relative cheapness, ease of starting, and general all-around fool-proof qualities of fine American induction motors. With low motor and control investment costs, with operation and maintenance charges minimized, induction motors have long been the favorite choice of American manufacturers. In 90 per cent of the

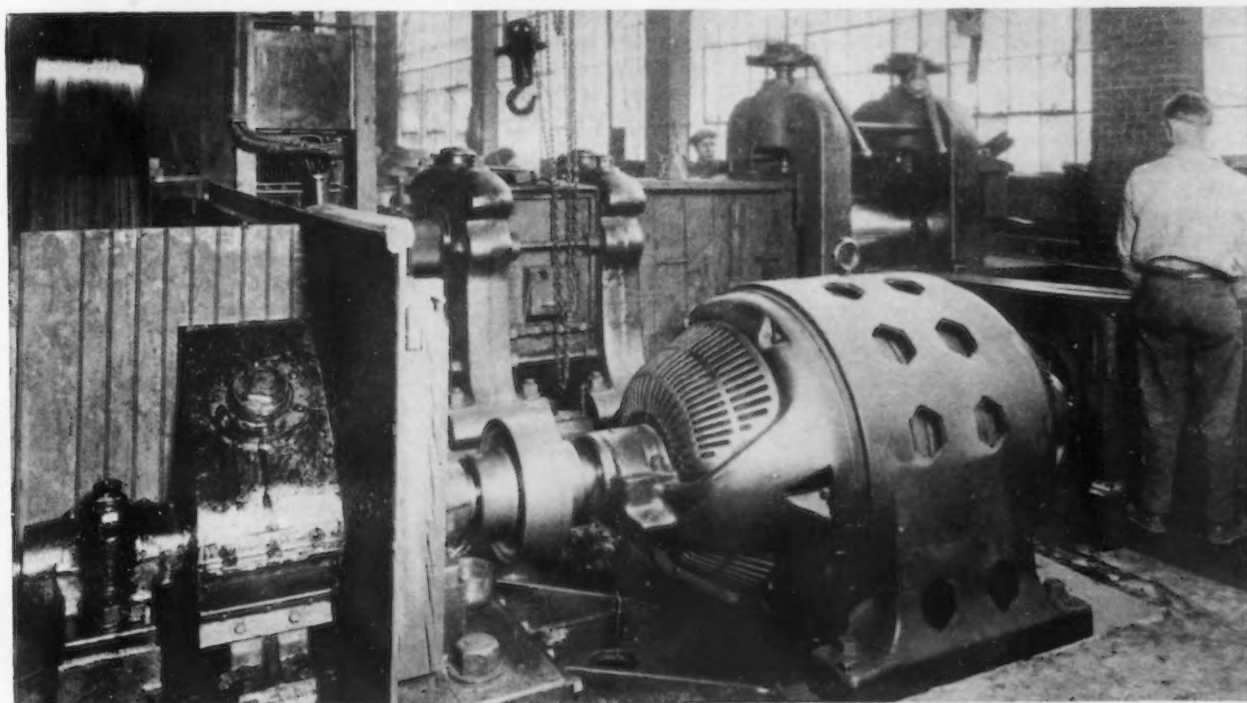
factor may be tied in to any or all of these conditions:

A. Improperly planned motor applications, resulting in over-motoring in excess of logical requirements.

B. Excessive variation in voltage, seriously affecting operation and resulting in losses from lowered output or in impaired quality, and

factors being held equal, was a 2 per cent decrease in total production costs in those departments.

Excessive variation in voltage may be caused by combining on a single distribution line serving normally loaded equipment, one or more pieces of apparatus that take, at varying intervals, large supplies of current; such as cranes or hoists,



cases the choice has been logical; for, as with hard liquor, it is not the use, but the abuse which causes difficulties.

Most well-designed, well-made induction motors will operate at what is called good power factor (that is 80 per cent or better) when operated at full rated load. It is under low load conditions that power factor becomes bad. This fact is made clear by the Westinghouse chart reproduced here—a composite of the curves of a large number of induction motors tested under varying load conditions. All induction equipment has better power factor at full load than when underloaded.

This is the first and greatest fault of such equipment, for it is seldom possible to arrange to keep it operating continuously at full load. Generally other conditions make it appear wise to install induction equipment of larger capacity than is normally needed; as a consequence, operation at from one-quarter to three-quarters full load rating, rather than full load, is the rule.

The correction of low power

caused by improperly planned distribution of equipment on the line.

C. Failure to balance the varying loads of a number of machines against each other, where such balance is possible of attainment.

Power Factor Correction

Before considering the application of electrical corrective equipment to a low power factor situation, it is advisable to study the loads at which each piece of induction apparatus is usually operated, to determine whether some purely mechanical changes may not be made so that each motor may be used under more nearly full load conditions. For instance, a motor car manufacturer made a careful study of 704 motors used in small parts departments, and found that many were oversize for the work on which they were used. At a cost of \$3,000, 278 motors were changed to smaller sizes, the total installed horsepower was cut from 1710 to 878 hp., the power factor was raised from 68 per cent to better than 78 per cent, and the motor investment account decreased by some \$10,000. The net result, other

welding equipment, or an unusually heavy machine. Often a decided improvement may be made by serving such highly "individual" equipment from a separate feeder line, equipped with automatic voltage regulation devices; leaving the normally loaded equipment on the original distribution system under non-varying voltage conditions.

Likewise, where batteries of machines may be combined for operation into logical production units driven from a single large motor, instead of separate individual motors, the principles of modern group drive will be found of great value in improving low power factor conditions.

When any of these means may not be used, or when used do not effectively correct low power factor conditions, electrical equipment may be used to meet the requirements of any case.

In general this electrical equipment may be classified under two heads; fixed and movable devices. Fixed equipment takes the form of a capacitor (condenser); and movable equipment may be a syn-

chronous motor, a synchronous condenser, or capacitor motors.

A capacitor is a bank of condensers acting much as an equalizing reservoir acts on a water supply system. It stores, and releases on demand, electrical pressure. No current flows through a condenser. There are no moving parts. A capacitor may be installed in any convenient place on the distribution line and is fool-proof under all operating conditions. When the induction system is first started, the capacitor receives and stores a charge of reactive component of the power supply. Thereafter it releases to the system a value of "leading" reactive component sufficient to balance, or very nearly balance the "lagging" reactive component required to energize the magnetic fields of the apparatus in

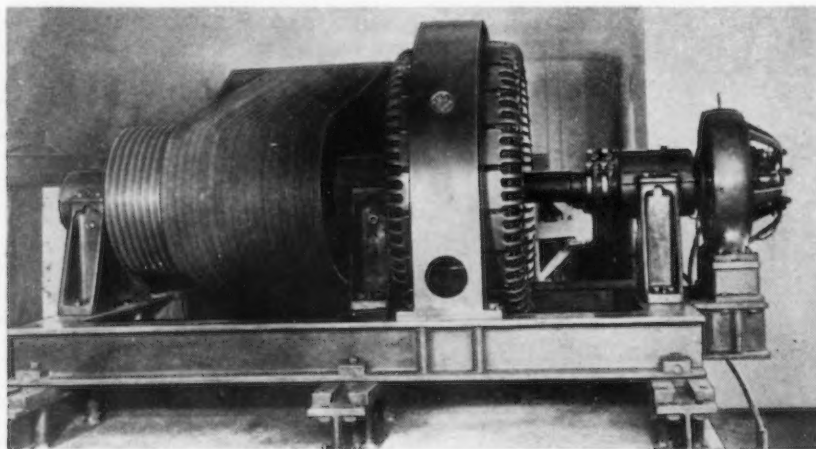
and the average power factor 85 per cent.

A synchronous condenser is a synchronous motor placed on the line under no load. It supplies the system with leading reactive component to balance the lagging component of the induction system. Such an application is sometimes called a "rotary converter."

Induction motors of the wound rotor, slip ring type may be equipped with built-in capacitors, causing them to operate at unity power factor, of 80 per cent leading power factor. Their use may be advantageous for the purpose of raising the average power factor of an induction system.

Summary

The correction of low power factor conditions by (1) the mechani-



A G.E. synchronous motor operating at 80 per cent loading power factor. This is the general type of motor so largely used to counteract the low power factor conditions imposed by a large number of induction machines.

use. Thus, electrically, the function of a capacitor is to balance the conditions that make for low power factor.

A synchronous motor has its field energized by a separate direct current source; consequently all the alternating current supply is working current, or real power. A synchronous motor operates at unity power factor, just like a direct current motor, or may operate at 80 per cent leading power factor, in which case it actually introduces into the system a leading reactive component to balance the lagging reactive component required by the induction apparatus of the system, equivalent to 80 per cent of the a. c. current drawn for its operation. A synchronous motor operates under load; hence if the induction motor load is 100 hp. and the power factor is 70 per cent, adding a unity power factor synchronous motor handling 100 additional horsepower to the

system makes the total load 200 hp. cal rearrangement of machines and motors to secure more uniformly loaded equipment, and by (2) electrical corrective equipment to balance lagging component with leading component, must include a careful study of the particular requirements of each case considered. In general it is always a problem of balancing to a greater or less degree, the total value of the electrical current required for the operation of the system, against the total value of the current actually consumed for power producing purposes. That most efforts to secure a reasonable balance of these factors yields dividends which decrease production costs, is generally accepted today. Three typical examples may be cited here in this connection:

A manufacturer of weighing equipment installed capacitors to raise power factor from 67 to 85

per cent, and decreased the annual power bill by \$2,890, or 11½ per cent. A capacitor installation in the plant of a motorcycle manufacturer raised the power factor from 70 to 90 per cent, enabling the concern to take advantage of a lower utility power rate at a saving of over \$9,000 per year on an annual power bill which had been almost \$70,000.

A large wood-working plant in the middle West, producing its own power from the burning of refuse materials, bought a number of new machines equipped with individual motor drives. The new operating conditions imposed a very low power factor on the whole system, the generator heated up frequently, and voltage regulation became so bad that frequent stoppages of production resulted. The management considered buying another generator, to duplicate the capacity of the existing one. Instead, a synchronous condenser was floated on the line (with no load). It brought up the power factor to a very satisfactory point, made possible the addition of an even greater load on the old generator, and cleared up completely the voltage regulation difficulties.

The correction of low power factor may mean, from the economic point of view, lower investment charges on plant equipment, decreased power costs, increased machine efficiency, better voltage regulation, decreased production costs, and lower power rates when power is purchased; to say nothing of securing more power to meet increased production demands from the same capacity of generating equipment. Hence the correction of low power factor conditions is decidedly a factor in lessening production costs.

General Electric Orders Gain Sharply

ORDERS received by General Electric Co. during the first six months this year amounted to \$217,265,619, an increase of 59 per cent over the \$136,968,597 received during the same period last year, President Gerard Swope has announced. The record first half year was in 1929, when orders received amounted to \$220,716,456.

Orders received during the second quarter of 1937 amounted to \$111,518,589, compared with \$77,398,718 during the corresponding quarter of 1936, an increase of 44 per cent. The second quarter this year was the largest since the third quarter of 1929.

Drop Forgers Adopt Standard Tolerances

STANDARD tolerances for forgings have been adopted by the forging industry represented by the Drop Forging Association, Cleveland, and were placed in effect recently by members of the association. The standards apply both to drop hammer and to upset forgings. Forgers have long felt the need of recognized standard tolerances for their products. Practices followed by forge shops have not been uniform because the industry has had no standard tolerances. When a buyer purchased similar forgings from two shops, he often found that the two makers did not adhere to similar practices in respect to tolerances. Greater need for standard tolerances also has been caused by the more exacting demands of customers whose specifications call for forgings with closer dimensional limits than formerly were acceptable. Without standard tolerances, the forging industry had no yardstick to gage its products.

In the preparation of standardized tolerances the Drop Forging Association made a survey of all its members from whom it secured data showing their individual practices in respect to tolerances. From the data thus made available the association prepared its standard tolerances which were approved by the members.

Standard tolerances are classed as either special or regular. Regular tolerances are divided into two classifications: Commercial standard tolerances for general forging practice, and close standard tolerances for forgings requiring extra close work involving additional expense and care in the production of the forgings. The commercial standard tolerances are to apply when no standard is specified.

Regular tolerances cover thickness, width and length, draft angle,

TABLE I
Thickness Tolerances in Inches

Net Weights up to, Lb.	Commercial		Close	
	—	+	—	+
0.2	0.008	0.024	0.004	0.012
0.4	0.009	0.027	0.005	0.015
0.6	0.010	0.030	0.005	0.015
0.8	0.011	0.033	0.006	0.018
1	0.012	0.036	0.006	0.018
2	0.015	0.045	0.008	0.024
3	0.017	0.051	0.009	0.027
4	0.018	0.054	0.009	0.027
5	0.019	0.057	0.010	0.030
10	0.022	0.066	0.011	0.033
20	0.026	0.008	0.013	0.039
30	0.030	0.090	0.015	0.045
40	0.034	0.102	0.017	0.051
50	0.038	0.114	0.019	0.057
60	0.042	0.126	0.021	0.063
70	0.046	0.138	0.023	0.069
80	0.050	0.150	0.025	0.075
90	0.054	0.162	0.027	0.081
100	0.058	0.174	0.029	0.087

quantity, and fillets and corners. The thickness tolerance, Table I, applies to the over-all thickness of a forging.

Width and length tolerances are alike and apply to the width and/or length of a forging. When applied to drop hammer forgings, they apply to the width or length in a direction parallel to the main or fundamental parting plane of the die, but only to such dimensions as are enclosed by and actually formed by the die. When applied to upset forgings, they apply to the width or length in a direction perpendicular to the direction of travel of the ram. These tolerances are classified in three subdivisions: Shrinkage and die wear tolerance; mismatching tolerance; and trimmed size tolerance.

Shrinkage and die wear tolerances apply to that part of the

TABLE II—Shrinkage and Die Wear (Inches)

SHRINKAGE			PLUS			DIE WEAR		
Lengths or Widths up to, Inches	Commercial + or -	Close + or -	Net Weight up to Pounds	Commercial + or -	Close + or -			
1	0.003	0.002	1	0.032	0.016			
2	0.006	0.003	3	0.035	0.018			
3	0.009	0.005	5	0.038	0.019			
4	0.012	0.006	7	0.041	0.021			
5	0.015	0.008	9	0.044	0.022			
6	0.018	0.009	11	0.047	0.024			
Each additional inch add	0.003	0.0015	Each additional 2 lb. add	0.003	0.0015			
For Example			For Example					
12	0.036	0.018	21	0.062	0.031			

TABLE III—Mismatching Tolerances

Net Weight up to, Pounds	Commercial	Close
1	0.015 in.	0.010 in.
7	0.018 in.	0.012 in.
13	0.021 in.	0.014 in.
19	0.024 in.	0.016 in.
Each additional 6 lb. add	0.003 in	0.002 in.

forging formed by a single die block only. They do not apply to any dimension crossing the parting plane. They are the sum of the shrinkage tolerances and the die wear tolerances as given in Table II. The shrinkage tolerances and die wear tolerances are not to be so applied as to include draft or variation thereof.

Mismatching tolerances, Table III, are independent of, and in addition to, any other tolerances. Mismatching is the displacement of a point in that part of a forging formed by one die block of a pair, from its desired position when located from the part of the forging formed in the other die block of the pair. Mismatching does not include

(CONTINUED ON PAGE 120)

TABLE IV—Draft-Angle Tolerances for Drop-Hammer Forgings

	Nominal Angle	Commercial Limits	Close Limits
Outside	7 deg.	0 to 10 deg.	0 to 8 deg.
Inside holes and depressions.	<div style="display: inline-block; vertical-align: middle;"> <div style="font-size: 3em; vertical-align: middle;">{</div> <div style="display: inline-block; vertical-align: middle;"> 10 deg. 7 deg. </div> </div>	0 to 13 deg.	0 to 8 deg.

Draft-Angle Tolerances for Upset Forgings

	Nominal Angle	Commercial Limits	Close Limits
Outside	3 deg.	0 to 5 deg.	0 to 4 deg.
Inside holes and depressions..	5 deg.	0 to 8 deg.	0 to 7 deg.

Six-Spindle High-Speed Automatic Chucking Machine

THE model 65 New Britain here illustrated is a new six-spindle, high-speed, work-rotating chucking machine, supplementing the models 14, 49 and 675 machines introduced a short time ago by the New Britain-Gridley Machine Co., New Britain, Conn. The machine can be equipped with six 5¼ in. two or three-jaw chucks or special fixtures to suit special jobs.

lb. per sq. in. Chucking is operated in conjunction with synchromesh positive jaw clutches on the spindles.

The hydraulic chuck mechanism is equipped with a device which automatically throws out feed, if for any reason the hydraulic pressure should fall below the predetermined requirements for gripping the work. The mechanism is also equipped with an electric in-

terlock, which prevents the operation of the machine until the necessary pressure is built up in the chucking cylinders, and further prevents indexing until the chuck is closed and the spindle clutches engaged.

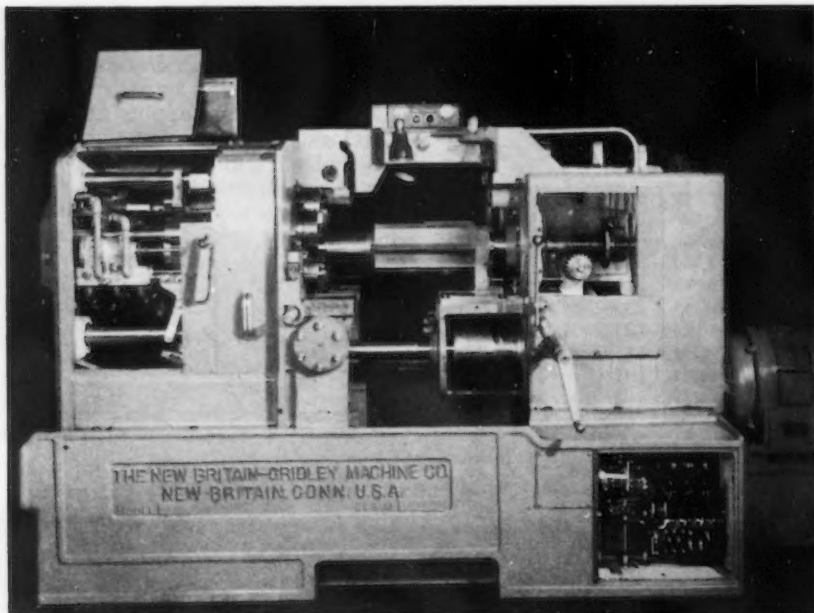
The tool lubricating system is supplied by a low-pressure centrifugal pump with a capacity of 50 gal. per min. Provision is made for the application of a high-pressure oiling system for oil tube tools when required. Chip space of extremely large capacity is provided.

The threading attachment may be operated in three positions, but an auxiliary slide mechanism is required. Self-opening die revolving mechanism may be operated in any or all positions.

The spindles are short in length to eliminate deflection and are mounted in extra large diameter, preloaded radax type bearings, thereby preventing all radial and axial deflection under maximum tool pressures.

The three cross-slides are mounted on extra large diameter circular studs, entirely enclosing their bearings and are fitted with tool holder bases, the T-slots of which are ground in parallelism with the axis of the spindle. An extra slide, independently operated, can be applied if required. Cross-slide cams are of flat-disk type, entirely enclosed, quickly removable and transposable to any one of the three cross slide positions.

The tool-slide is hexagonal in shape. It is actuated with a drum type cam, through roller and torque guide plates. A wide selective range of feed changes is provided

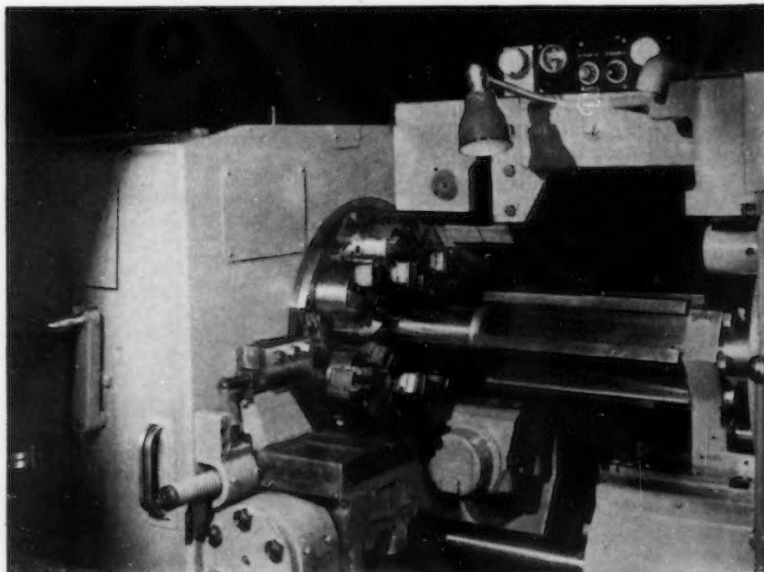


Front view of the New Britain-Gridley six-spindle automatic chucking machine, with cover plates removed, showing the drum-type cam for the hexagonal tool-slide and the hydraulic control for regulating the chucking pressure.

In appearance, the machine follows the same box type construction as the Model 61 six-spindle automatic screw machine, described on page 44 of the Aug. 6, 1936, issue. Ample chip space and maximum tooling accessibility is provided, assuring ease of set-up and minimum maintenance time. Rotating tools can be used in all positions and threading or tapping attachments can be used in any or all of the last three positions.

All of the New Britain features are continued, such as preloaded ball bearing spindles, automatic lifting of the spindle carrier before index, automatic clamping of the spindle carrier after indexing, and circular section heavy-duty cross slides.

Chucks are operated through a patented hydraulic system. With this system, instantly adjustable chucking pressures are provided within a range of from 40 to 300



CLOSE-UP of the work-holding chucks and the hexagonal tool-slide. Hydraulic chucking pressure is read on the dial gage at the top of the connecting member between the headstock and the power box.

for the tool-slide and cross-slides through pick-off change gears.

Auxiliary slides can be applied in three positions for carrying threading tools, accelerated reamers and any other tools requiring operation independent of the main tool slide.

Drill speeders are available for any desired position, with preloaded ball bearing mounts, driven through pick-off change gears. Threading with self-opening dies can be performed also with this attachment.

Rubber Lubricant of Colloidal Graphite

A COMPOSITION, of which colloidal graphite is an important constituent, has been designed as an effective and lasting lubricant for mechanical rubber elements. The patent on the product recently granted to George F. Willson, Cleveland sales representative of the Acheson Colloids Corp., Port Huron, Mich., has been assigned to the corporation.

The use of rubber parts in machines of various sorts has greatly increased in the last few years. The utilization of rubber mechanical elements is particularly noteworthy in the automotive industry, such as in spring shackles. Rubber is also used in weigh bar bearings, trunnions, axle spring seats, motor mountings, individual suspension controller arm bearings, shock absorber links, silence strips, fan belts and the like.

The lubrication of rubber parts has presented a troublesome problem because of the softening action of the usual lubricating agents and compositions, such as mineral oil. It has been found that the new composition overcomes these objections and is very effective as a lubricant of rubber parts.



Bores as Small as 1/4 In. Honed Accurately on Production Basis

THE production honing of bores down to 1/4 in. in diameter with the tolerance for roundness and straightness held to 0.000025 in. is claimed for the machine here illustrated, which has been placed on the market by the Micromatic Hone Corp., Detroit, under the trade name of the Microhoner.

The machine has been applied in the automotive, refrigeration and sewing machine industries. It is designed for finishing bores ranging in diameter from 1/4 to 7/8 in., with maximum length of 2 3/4 in. for the smaller diameters up to and including 7 1/2 in. for the larger diameters. Production is said to range up to 180 to 200 pieces per hour when removing 0.0007 to 0.001 in. stock from a ground hole in hard metal, and as many as 125 to 150 pieces per hour (depending upon bore diameter and length) when removing from 0.001 to 0.002 in. stock from reamed, broached or precision bored holes in cast iron or soft steel. Micromatic's featured "Mirror Finish" is produced with free cutting action in one operation.

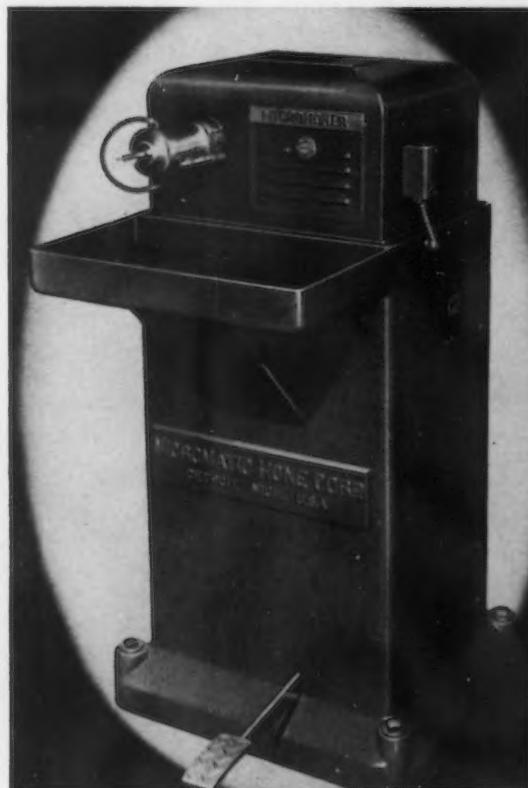
The machine incorporates the wobble plate principle to obtain a high-speed mechanical reciprocating motion. This, combined with rapid rotation, accomplishes the required spiraling or helical travel of

the abrasive to produce a cross-hatched hone finish. Any desired variation of cross-hatch or of relative speeds of operation can be obtained by interchanging pulleys.

Foot pedal control is provided for starting and stopping the machine, and the operator's hands are free for holding the work or for making adjustments. A single foot movement engages the clutch and expands the hone; also one foot movement stops the reciprocation and rotation, while releasing the clutch and applying the brake simultaneously with the collapsing of the hone.

The honing tools employed incorporate features common to all Micromatic production tools made by the company. The honing sticks are held rigidly against the bore wall by controlled, constant pressure regulated by a caged feed spring independently of the operator. The angle of taper on the stone holders and the body of the tool is beyond the angle of reversibility so that no amount of pressure on the stones will collapse the tool. Continuous feed or expansion of the stones, during each cycle of operation, is obtained without resetting by the operator for each piece of work honed. Expan-

CAPACITY is for finishing bores ranging from 1/4 to 7/8 in. in diameter. Application of electric gaging equipment on a Microhoner is pictured below.



sion of the tool is controlled through calibrated adjustment which can be made while the machine is in operation. The abrasive sticks are mounted in easily replaceable die-cast holders. Hone bodies are available for every 1/32 in. increase in diameter of bores; they are made with bayonet lock to facilitate quick interchange on the machine.

The machine is equipped with coolant tank, pump and filter, with

the discharge nozzle piped to the honing spindle head. Standard motor equipment includes a ¼-hp. 1725-r.p.m. motor.

The close-up illustration shows the application of electric gage equipment on a Microhoner used for finishing a bore measuring 0.312 in. in diameter by 2⅞ in. in length. In this application the part is said to be finished to a tolerance of 0.000025 in. for roundness and straightness.

runs the working surface 2 in. on both front and back edge of the table.

Cross-traveling movement normally operates at each reversal of the table, and the amount of cross-travel can be set by adjustable dogs at anything from less than 1/32 in. up to 2 in. for each reciprocation of the table. Upon completing the desired cross travel in one direction, the head automatically reverses and cross travels in the opposite direction. The cross travel can be reversed by hand if desired. Adjustment for amount of cross travel at each reciprocation of the table is by means of a small handwheel in central control panel.

Truing and dressing of the grinding wheel is accomplished by throwing a lever on the front valve plate to the left.

The standard spindle is of special flanged, ball-bearing type with an adjustable amount of preload, but a bronze bearing mounted in a quill can be furnished. In either case the spindle is of special alloy steel, heat treated, and is of generous dimensions.

Standard spindle drive is by a 25-hp. 1150-r.p.m. motor, which directly drives the spindle through a splined end, thus relieving the cross-traveling mechanism of carrying the weight of the motor. A feature of this arrangement is that the motor stays in one position and does not accompany the spindle on its cross travel.

A 20-in. diameter, 4-in. face grinding wheel is regularly supplied on the 16 and 18-in. wide

Surface Grinder Has Accurate Cross-Traveling Head

HEAVY, vibrationless construction, centralized control, and a spindle design intended to assure accurate grinding over the entire range of the machine are features of the high-speed, cross-traveling-head type hydraulic feed surface grinder illustrated, a new product of Gallmeyer & Livingston Co., Grand Rapids, Mich.

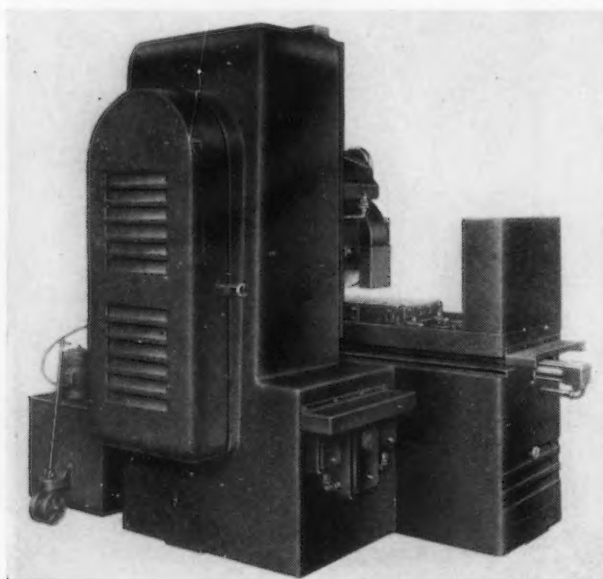
Both the base and the upright column that carries the vertical sliding head are heavy one-piece castings. In addition to walls of 1⅝ in. and greater thickness, the column is generously ribbed and is keyed, bolted and doweled to the base member in a manner said to make the two castings practically integral. As the base is

twice the length of the working surface of the table, the latter in normal operation is always solidly supported.

Hydraulic table speeds are infinitely variable from practically nothing up to 150 ft. per min. when the machine is driven by a 60-cycle motor. Table start and stop and speed control is by means of a single lever at the front of the machine, which lever operates in approximately a 90-deg. arc between the stop and full speed position.

The cross-traveling spindle slide has a movement equivalent to a table working service width of either 16 or 18 in. Thus the standard 4-in. wide grinding wheel over-

THE coolant tank is a separate portable unit with the pump mounted on top of the tank, as shown in the rear view below.



CCROSS-TRAVELING-HEAD type hydraulic feed surface grinder featuring vibrationless construction and a spindle design intended to assure high accuracy.

machines, but other sizes can be furnished. The capacity under the 2-in. diameter wheel is 17 in. Additional vertical capacity, as well as longer and wider than standard tables, can be furnished.

Power elevation of the vertically moving head slide, a standard feature, is by a ½-hp. motor controlled by a double-throw directional switch at the right of the central valve plate. Power elevation remains operative only as long as pressure is applied, and the switch automatically throws to neutral, or off position, when hand pressure is released.

Vertical movement of the wheel-head when grinding is controlled by the large handwheel on the front of the base, this handwheel being graduated in a 0.0001 in., or metric equivalent. The handwheel remains stationary while power rapid traverse of the head is in operation—a safety feature—but is automatically connected for hand movement when the power elevating motor is disconnected.

Wet grinding equipment is regularly furnished. As seen in the rear view illustration, the coolant tank is a separate portable unit with the pump mounted on top of the tank.

The oil for the hydraulic feed is contained in a tank in the base of the machine, the tank being readily accessible for filling, draining or checking of the oil supply. A pressure gage on the main valve plate indicates the hydraulic pressure at all times.

Automatic force-feed lubrication of the table ways is provided from the pressure line, and used lubricant is filtered before it returns to the circulating tank. All other points requiring oiling are lubricated by the Bijur one-shot system, one push on the control handle of which provides sufficient lubrication for a full day's operation.

From the illustrations it will be seen that all operating controls are centralized at the center of the base. Spindle motor and the mechanism housed in the column are readily accessible through a door on the back of the column, as shown in the rear view.

Division of Simplified Practice of the National Bureau of Standards has announced that printed copies of Simplified Practice Recommendation R166-37, Color Code for Marking Steel Bars, are now available. Copies may be obtained from the Superintendent of Documents, Government Printing Office, Washington, for 5c. each.

Cylindrical Grinder Entirely Automatic, Including Loading

NORTON CO., Worcester, Mass., has brought out a specialized, entirely automatic arrangement of its 10-in. Type C cylindrical grinding machine designed for plunge cut operations.

A minimum amount of attention is required from the operator. The manual work consists of keeping the loading fixture supplied with work, compensating for wheel wear by means of a standard mechanism adjustable to 0.0001 in., and truing the grinding wheel when necessary to maintain the desired finish. The wheel-truing mechanism is built into the wheel guard and is hydraulically operated.

The automatic grinding cycle includes placing the work in the holding and driving position, grinding to accurate size, releasing the finished piece and dropping it into a return chute. The time required for the automatic cycle is regulated by means of a hydraulic valve which may be adjusted at any time during the operation of the machine.

Safety of operation is an important feature, the machine being designed so that failure of any mechanism to perform its functions will cause all other mechanisms to stop automatically.

Type of headstock, footstock and work-loading fixtures vary according to the shape and size of the work and the grinding requirements. A chute-type loading fixture arranged for handling steel bushings internally splined is here illustrated. A hydraulically-operated set of fingers at the bottom of the chute picks off one bushing and advances it between the centers of the two live-spindle synchronized work-

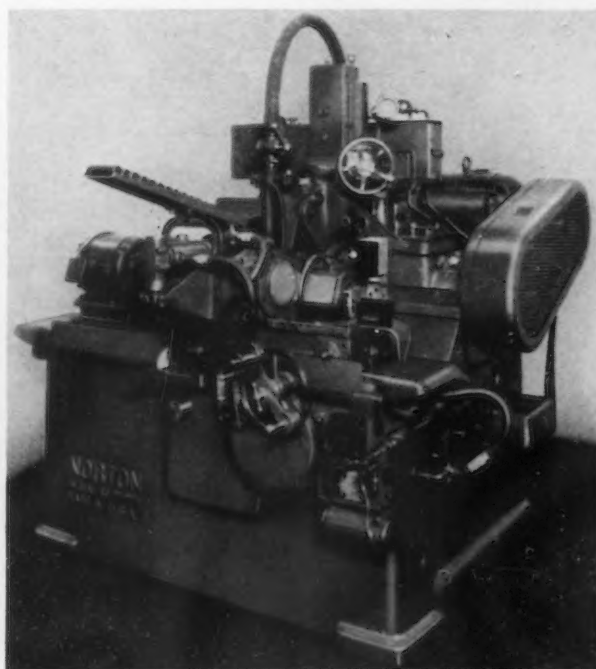
heads, simultaneously removing the previously ground bushing and dropping it into the return chute.

Nominal capacity of the machine is 10 in. diameter and 18 in. length; actual capacity, however, is determined by the work and the design of the work-heads and loading mechanism. A grinding wheel 24 in. in diameter and up to 5 in. wide or 20 in. in diameter up to 7 in. wide is employed.

New A. C. Arc Welders

WITH the recent addition of a 150-amp. a.c. transformer-type arc welder, the Wilson Welder & Metals Co., Inc., 60 East Forty-second Street, New York, is now offering a.c. units in capacities of 150, 300, 500, 750 and 1000 amp. All are complete and self contained, requiring no accessories except the welding cable, electrode holder and hand-shield.

Important features include a system of three controls or adjustments of the welding current. Through the first two controls it is possible to obtain 25 coarse adjustments, while third control offers a further and finer adjustment of current values within any one of the foregoing 25. By means of these three controls an infinite number of settings may be secured.



NORTON type C cylindrical grinder with loading fixture that provides fully automatic operation.

Plain Hydraulic Grinders for Relatively Long Work

THE 10 and 14-in. Type BD plain hydraulic grinder has been added to the line of the Landis Tool Co., Waynesboro, Pa., for the grinding of relatively long work of small diameter. Tinning rolls, steckel mill rolls, shafts and spindles are representative jobs. When necessary, the table may be gapped to swing work having projections. This new machine supersedes the 10 and 14-in. Type B plain machines, many of the features of which are retained. New features have been added making the Type BD much more modern and productive.

The dynamically balanced wheel drive motor is mounted on the rear of the wheel base from which point the drive is through multiple V-belts. Babbitt lined wheel spindle bearings are used, flood lubricated with filtered oil. Sight feed valves at the top of the wheel base enable the operator to check and regulate the flow of oil.

An all multiple V-belt work drive is a major feature of the headstock. One simple adjustment is provided to maintain the proper tension on both jackshaft and faceplate drives. The smoothness of a drive of this type is essential for the high finish demanded for such work as steckel mill rolls.

The hydraulic system consists of a low-pressure, variable-flow pump and a continuous motor, both mounted on anti-friction bearings. The speed range is from 12 to 240 in. per min.

The pump drive motor is mounted at the rear of the bed, and drives forward through multiple V-belts to the oil pump mounted within the bed. The water pump is of the centrifugal, self-priming type and is coupled to the end of the oil pump shaft. Its bearings are fully protected and the suction line is cast integral with the body to eliminate air leaks. Should a

d.c. generator be required for the headstock motor, it is driven by multiple V-belts from the water pump shaft.

The Type BD machine is available in four sizes, namely, 10x96 in., 10x120 in., 14x96 in., and 14x120 in. Three electric motors are required. The work drive motor on the 10-in. machines is 1 hp., adjustable speed, while the size of this motor is increased to 1½ hp. on the 14-in. machine. The wheel drive motor is a 15 to 20-hp. constant-speed and the pump drive motor is a 5-hp. constant-speed unit.

Small Test Indicator Is Light and Sensitive

THE small test indicator here illustrated, a new product of the Federal Products Corp., Providence, R. I., is designed for use in surface gages, height gages, tool-posts, or in special fixtures. Its light weight (33.35 gm., without holding bar) and sensitivity are emphasized as making for maximum accuracy when the instrument is used with the light supporting members.

Two models are available. The indicating dial of one, the model No. 1, is graduated in 0.001 in. and has a range of 0.030 in.; that of the model No. 2 is graduated in 0.0001 in. and has a range of 0.008 in. Both models incorporate the company's low-friction jeweled movement and are regularly equipped with a universal holding bar and clamp. Either swivel or

fixed contact points can be supplied, and the arrangement is such that motion of the contact point may be reversed merely by shifting



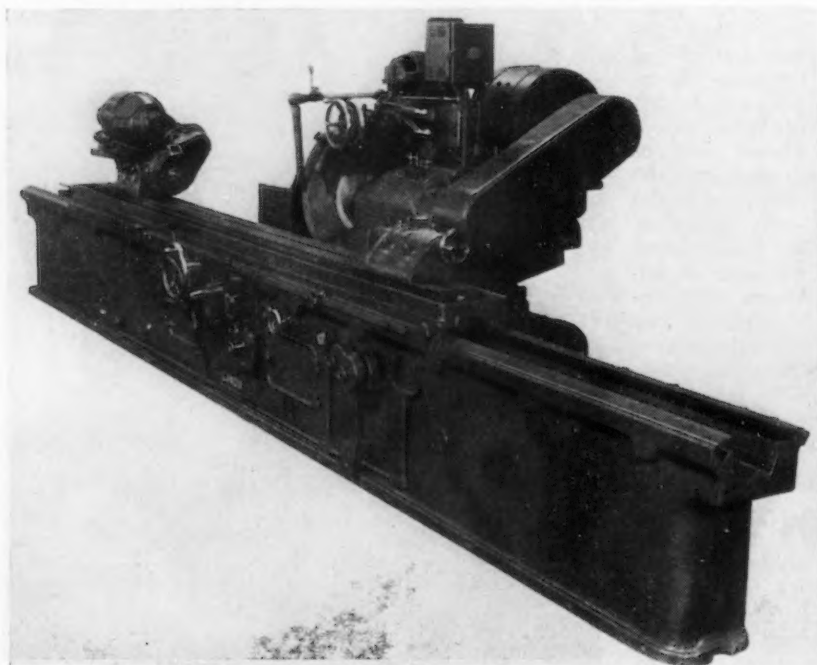
a lever. Adapter rods can be furnished for use with surface or height gages or test sets.

The instruments are approximately 3 3/64 in. long and have a 1½ in. diameter rotating dial. The model No. 1 is equipped with an 0-15-0 dial and the model No. 2 with an 0-40-0 dial.

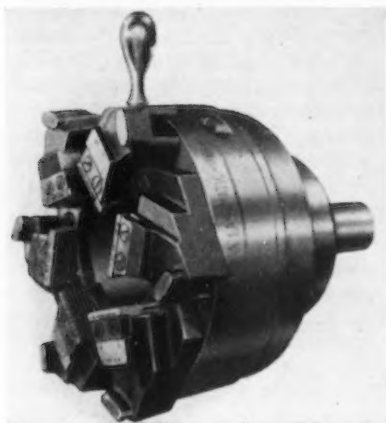
Six-Chaser Die Head For Large Diameters

FOR threading large diameters, long thread lengths, the Landis Machine Co., Waynesboro, Pa., has added to its Landmatic series of die heads the 40 AX model here illustrated. Diametrical capacity is 4 to 5½ in. with a pitch range of 7 to 20 threads per inch. Thread length is sufficient to take in an exceptional range.

The new die head is of self-opening, pull-off type for application to turret lathes and hand screw machines. It is heat treated throughout and ground for maximum wearing qualities. Graduations on the circumferential surface and micrometer graduations on the adjusting screw assure



rapid and accurate size changes. Use of six chasers instead of four is emphasized as making for wider distribution of the cutting load, resulting in an increase in tool life



This Landis 40 AX die head has 7-in. thread length capacity on 5/8 in. diameter.

with more threads obtained per grind of the chaser, improved quality of the product being threaded, and also increase in the life of the die head.

Changes in B & S Geared "Motorpumps"

CHANGES in the design of its Nos. 101, 102 and 103 rotary geared Motorpumps have been announced by the Brown & Sharpe Mfg. Co., Providence, R. I. These pumps are now made to run in one direction only, either right-hand or left-hand, the hand being determined by the side of the pump on which the discharge is located when viewed from the motor end. The direction of discharge is indicated by an arrow on the cap of the pump. A mechanical seal is now used on these units in place of the packing used heretofore.

Motorpumps are now available with three-phase motors both in 220 and 440 volts, 60 cycle, in addition to the previous listings. Similarly, the No. 204 centrifugal Motorpump is now regularly furnished with three-phase, 50-cycle, 220-volt motor.



Precision Internal Grinder Features Wide Range

UNUSUALLY wide range and easy access for set-up and adjustment are emphasized by Rivett Lathe & Grinder, Inc., Brighton, Boston, in presenting its new No. 112 precision internal grinder, designed primarily for medium and large tool-room work.

The machine may be employed for straight, bevel, two angle, or straight and bevel grinding at one setting. With a low-speed spindle and a 6-in. diameter, 1/2-in. face wheel, it may also be used for external grinding. Hole diameter grinding capacity is from 1/2 to 8 in.

Single bevel or single taper work is ground by swiveling the work-head or the table top-slide. A unique feature is the swivel cross-slide. By swiveling this cross-slide to the desired angle and setting the grinding spindle on the center line of the machine, a straight hole may be ground using power reciprocation of the table. Then, by disengaging the latched lever on the gear box, the power reciprocation may be thrown off, and an angle at the mouth of the hole may be concentrically ground without re-chucking, by traversing the cross-slide by means of its hand-wheel. Similarly, by swiveling the table top-slide, a taper hole and a bevel may be ground.

The work-head and work reciprocate with the table while the

grinding wheel remains stationary. The work-head is mounted on a shoe and scraped to the upper table. It may be clamped in any position by two T-bolts. The base of the work-head is graduated to swivel 90 deg. each side of center so that the head can be set for taper grinding steeper than can be obtained by the 50 deg. swivel of the table. An individual motor drive provides three selective spindle speeds. The spindle mouth is ground to take Rivett 6 N.S., 1 in. collet capacity collets and step chucks operated by screw draw-in spindle or lever chuck closer. Jaw chucks, face plates, and other fixtures may be mounted on the threaded spindle nose.

The grinding spindle mounts in a bracket carried on the cross slide and is driven from a 2-hp., 3500-r.p.m. motor. Two spindles are available, one for high speed and one for low speed. The cross-slide on which the grinding spindle bracket mounts is carried by a swivel which is graduated to be set in any position up to 90 deg. right or left of center. Selective hand or power cross-feed is transmitted to the cross-slide when set in any position.

The table is mechanically reciprocated and the motion is arranged to slightly retard as the table approaches its center of stroke and accelerate immediately the central point is passed. This, it is stated,

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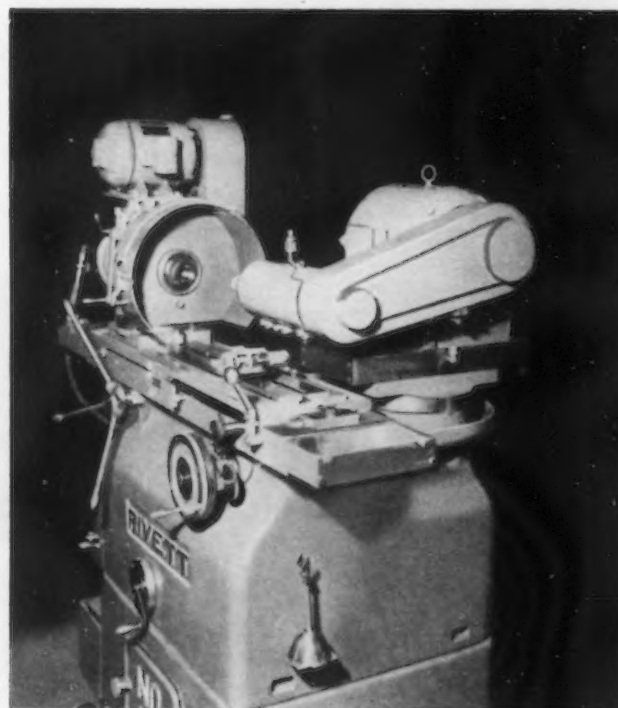
AT RIGHT

PRECISION internal grinder built for tool-room work, straight, bevel, two angle or straight and bevel at one setting.

o o o

AT LEFT

B & S "Motorpumps" are now made to run in one direction only.



produces straight ground holes and overcomes the danger of bell-mouthed holes. Eighteen selective speeds of table reciprocation are obtained through a gear box mounted on the side of the base.

The Rivett tip-over diamond fixture used for truing the wheel may be set for duplicating the original grind.

All moving parts are fully en-

closed and all drive bearings, reciprocating mechanism and table ways are automatically lubricated by the Blanchard Pulsolator system.

Specifications include: Automatic table travel, $\frac{1}{2}$ to 8 in.; table feeds, 18 selective; band table travel, 16 in., and swing over table, 14 in. Net weight, with motors, is 3635 lb.

Turret Lathe for Small Run Bar or Chucking Work

A COMBINATION bar and chucking machine with bar capacity of $1\frac{1}{2}$ x $9\frac{1}{2}$ x 16-in. swing for chucking work is being offered by Millholland Sales & Machine Co., Indianapolis, in the form of its improved No. 4-H turret lathe.

This machine is provided with 12 speed changes from 40 to 1000 r.p.m. as shown on a speed indicator. This enables the operator to select the proper cutting speed for the work and also enables the shop foreman to check the cutting speed at a glance. These speed changes are controlled by three levers which actuate sliding gears and clutches mounted on multiple spline shafts.

The spindle of the machine is mounted on double row "zero" Timken bearings at the front end and precision ball bearings at the back end. All other headstock drive shafts are mounted on selected ball bearings and all shafts and gears are heat treated. Once the speed has been selected, control of the machine is by a single lever shown at the top in the photograph. It controls the forward and reverse motion of the spindle through a

double multiple-disc clutch. In the neutral position the spindle is automatically braked through another multiple-disc clutch.

Twelve feed changes are provided ranging from 0.005 to 0.136 in. per rev. All the gears and shafts in the feed box are heat

treated and mounted on bearings.

The turret is of rugged construction with hexago turret, slide, and saddle of semi-steel. All parts subject to wear are made of alloy steel carefully heat treated. Six independent turret stops are provided for tripping the feed and providing an accurate length stop. The cross slide is suitable for heavy forming or facing cuts on bar and chucking work. The machine is available either with or without power cross feed. A longitudinal adjustment is provided for rapid setting.

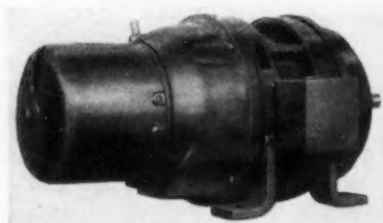
Standard bar and chucking tools available include: Quick indexing square turret tool post for cross slide, front and rear forming tool holders, and single and multiple tool holder. For the turret there are single and multiple roller box mills, floating reamer holders, pointing tool, releasing tap holders for bar work, single and multiple turning tools for chucking work, slide tools, boring bars, recessing tools and others.

Power Unit Combines Motor and Brake

A "DISC BRAKE" motor, which combines in a single unit the functions of a motor with those of a brake has been brought out by the Reliance Electric & Engineering Co., Cleveland. This power unit is designed for small cranes, hoists, auxiliary movements on machine tools and other equipment in which quick, automatic and accurate stopping or the holding of a load is necessary. With the disk brake motor it is stated it is often possible to connect the drive direct and thus avoid the need for clutches.

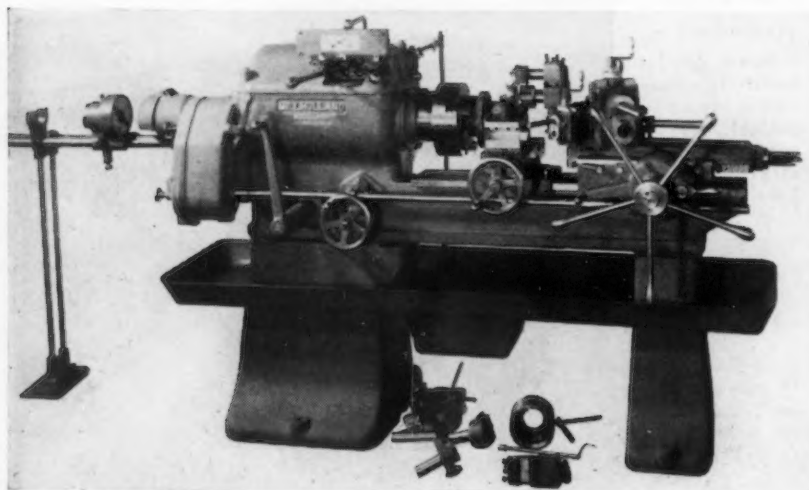
The brake itself consists of a simple and compact disk-type friction device that is mechanically

and automatically engaged when the current is shut off and magnetically disengaged when the current is applied. The friction lining is supported on a square steel hub which is keyed to the motor shaft. A "wear-indicator" combines with the manual brake release mechanism and gives warning whenever wear needs to be taken



up. This setting, however, is separate from the torque adjustment so that either may be adjusted independently. Varying brake power from maximum to 50 per cent of maximum, it is stated, may thus be obtained as needed.

The brake mechanism operates in any position and may be fitted to any standard d.c. or a.c. Reliance motor, except motors of fan-cooled type. Mounting dimensions conform to standard specifications, and standard brackets and bases may be used. The brake cover, which is separate from the mechanism itself, may be readily removed by loosening four cover screws, thus making all parts accessible.



Wear Test Procedure Gives Duplicable Results—Lists Good and Poor Irons

AT the recent American Foundrymen's Association convention at Milwaukee, Paul S. Lane, of Koppers Co., described apparatus and results obtained in wear testing as carried out by his company since 1934. It was stated that for the products examined (piston rings and cylinders for steam service), the apparatus gives good results that could be duplicated with reasonable accuracy and at the same time give a fair estimate of what can be expected in service.

One section of Mr. Lane's paper gave some examples of good and poor wearing irons for use in steam service. The testing apparatus is of the brake shoe test type, and the amount of wear is determined by the weight loss of the specimen. Arbitrary wear test rating has been set up, with 18 mg. weight loss per hr. as excellent, 26 to 30 mg. loss as fair and over 30 mg. loss as poor. Some typical analysis of both excellent and poor irons are shown in the accompanying table.

In discussing the cast iron structural features as related to wear characteristics, Mr. Lane stated that very "fine" or "sooty" graphite, particularly of the type resulting from "undercooling," is usually indicative of poor wearing qualities. This appears to be true over a wide range of hardness values. Gray irons, when annealed, to a ferrite-

graphite structure, wear very poorly. Considerable work has been done in England and Germany in determining the cause and manner of formation of a "supercooled" type of graphite. Investigations by Nipper and Piwowarsky indicate generally poor wearing qualities with this type of structure. This was confirmed by Mr. Lane's experiences wherein any approach to an extremely finely divided graphite precipitation, under dry operation, results in impaired wear resisting properties.

As regards to grain size, coarse, or moderate-grained irons seem more resistant to wear than do those of the fine-grained structure. Hence, grain-size exerts a major influence in determining wear resistance.

Irons having network formations, which are "heavy bodied" seem to have (other conditions being apparently equal) better bearing qualities than those wherein this mesh formation is "thin-lined." One might almost suspect here that more intimate and stronger joining, or more and better "cementing envelopes" exist with the heavier networks. Possibly what might be called "good intercrystalline cohesion" is what is desired.

According to Mr. Lane, it is not known exactly why moderate or large micro-constituents enhance

wearing qualities, but a great many observations seem to point to this being the case. It was suspected, however, that in some irons, the "effective" grain size is so small that the abrasives normally encountered in both dry and lubricated wear actually tear out the small crystals or at least seriously weaken and loosen them from the body or matrix. These same size abrasives cutting into a larger grain or "crystal" (it must be remembered that they are "large" in three dimensions) are then possibly only "surface scratched" or "nick-ed." Having more area of contact with the surrounding matrix, due to their greater volume, they might be expected to be more securely held, so that further rubbing effects close over the initial scratches without loosening of the entire grain. Thus, depending on the tenacity with which they are "keyed" into the matrix, they may be better able to resist this continuous "scratching and filling-up" action, than would a smaller grain. If the iron or metal is of the type which tends to "glaze" or "film," this cutting action gradually decreases in intensity finally becoming fairly uniform and we have what we consider "normal" wear. If such is the case, even to a degree, it can readily be appreciated why finely divided, high carbon irons, powder away so rapidly under dry wearing operations.

Mr. Lane pointed out, however, that this explanation is not in accord with the present-day theory regarding *strength* of metals, based largely on the fact that through

ANALYSES OF IRONS POSSESSING DIFFERENT WEARING PROPERTIES

Spec. No.	Wt. Loss "Wear" in Mg.	Brinell No.	Analysis—Per Cent								
			Si	T.C.	G.C.	C.C.	S	P	Mn	Ni	Cr
<i>"Excellent" and "Good" Wearing Irons</i>											
23	10.4	207	1.55	3.15	2.38	0.77	0.13	0.17	1.07	0.82	0.38
31	16.8	195	1.41	3.20	2.34	0.86	0.128	0.16	0.85	0.97	0.36
19	19.7	229	1.90	3.22	2.41	0.81	0.115	0.30	0.70	1.10	0.55
3	20.0	220	1.56	2.83	1.97	0.86	0.15	0.12	0.38	...	0.34
17	20.9	190	1.45	3.52	...	...	0.095	0.36	0.61	1.26	0.36
1	21.1	152	1.60	2.92	2.49	0.43	0.12	0.32	0.70	0.07	0.12
12	22.8	217	1.61	3.50	2.78	0.72	0.066	0.43	0.56	1.45	0.20
18	23.9	152	1.97	3.33	...	...	0.080	0.51	0.58	...	...
<i>"Poor" Wearing Irons</i>											
2	31.0	223	1.85	3.61	2.82	0.79	0.097	0.27	0.67	1.12	0.47
4	32.1	223	1.41	3.46	2.75	0.71	...	0.29	0.79	1.29	0.28
6	35.8	152	1.30	3.21	...	...	0.134	0.25	0.88	...	0.076
11	37.3	156	1.41	3.54	2.87	0.67	0.12	0.40	0.50	...	...
30	39.0	223	1.81	3.31	...	...	...	0.39	...	...	...
8	40.4	180	1.78	3.92	...	...	0.082	0.50	0.54	...	...
9	42.5	170	1.53	3.60	...	...	0.071	0.34	0.58	...	...
29	47.4	214	2.25	3.57	...	...	...	0.36	...	...	...

grain refinement, promoting better uniformity, more secure "keying," and fewer planes of weakness, we obtain maximum physical properties.

Mr. Lane also stated that "mass" and "section size," or cooling rate influence wear to a greater degree than chemical composition. In general, the same iron, poured into varying section sizes, will exhibit its poorest wearing qualities (under dry operation) in the lighter sections, and improve in wear resistance as section size or "mass" increases. This again reverts to "cooling rate" effects and resultant

grain size. This, along with the carbon content of the iron, may, in the main, determine wear resistance.

The experimental results likewise indicated that phosphorus, particularly if present in a heavy bodied network, appears to aid in resisting wear. The author was under the impression that some definite improvements in wear resistance may be had in irons of rather low phosphorus content by increasing the percentage of this element. No cases of this constituent spalling off and acting as abrasive in iron of normal structure was encountered,

though it is believed this may likely happen if the steadite is present in a too finely divided form.

High sulphur seems advantageous. It appears that the presence of sulphides, conferring as they do, additional heterogeneity to the structure aids resistance to wear.

Furthermore, for a given type of structure, best wear is had with total carbon contents of 3.40 per cent and under.

Very high pouring temperatures (about which much has been heard of in the past few years), if resulting in very fine grain, may result in impaired wearing qualities.

Cu, Mn, Cr. and P in Mild Steel Sheets

A DETAILED examination of six commercial steels in sheet form, having additions of one or more of the elements copper, chromium, manganese, silicon and phosphorus, was presented before the April meeting of the Iron and Steel Institute (British) by S. C. Britton, of Derby.

Mr. Britton stated that atmospheric corrosion tests on small samples at Derby showed, after 300 days, reductions in the rate of corrosion over that of a steel of ordinary quality, containing 0.09 per cent copper, of 30 to 32 per cent for additions of chromium, copper, phosphorus, and silicon, 19 to 27 per cent for additions of copper and chromium, and 12 to 14 per cent for additions of copper with or without manganese. When the steels are painted there is little difference in the time taken for rust to appear, but the high-phosphorus steels appear to have an advantage after rusting has made some progress.

Sheets having additions of copper with chromium, manganese or chromium, silicon and phosphorus all had good mechanical properties, the ductility of the steels with high contents of silicon and phosphorus being equal to that of the others. According to Mr. Britton all of them showed a slight reduction in ductility and an increase in hardness on aging after strain, but in no case was this sufficiently marked to affect the practical usefulness.

The greatest tensile strength was associated with the manganese addition, but considering both the mechanical properties and corrosion resistance, steels with additions of copper, chromium, phosphorus, and silicon together seemed to be the most promising of the types tested.

To Mr. Britton cupping tests seemed to be the most satisfactory method of following the course of aging effects in sheets, although tensile test measurements gave corroboratory evidence. An attempt to produce the necessary strain with the Erichsen machine was reasonably successful, and thus the whole of the mechanical part of the test can be carried through with it if desired.

Carboloy-Tipped Lathe Centers

THE CARBOLOY CO., INC., 2995 East Jefferson Avenue, Detroit, is announcing a special application of Carboloy on lathe and grinder centers, in which a Carboloy cone-shaped tip is substituted for the usual steel tip. It is claimed that these centers wear 50 times longer than ordinary centers.

Because of their diamond-like hardness, cemented carbides are well suited to resist the extreme wear on lathe and grinder centers, particularly where the work is nit-

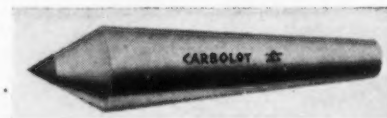
rided, case hardened or otherwise heat treated. In turning S.A.E. 2335 steel shafting, these Carboloy centers are said to have stood up three yr. with one regrinding. In addition to longer life and fewer reconditionings, greater accuracy and elimination of burning and scoring are claimed for the Carboloy centers, which are available in all sizes, completely finished and ready for use.

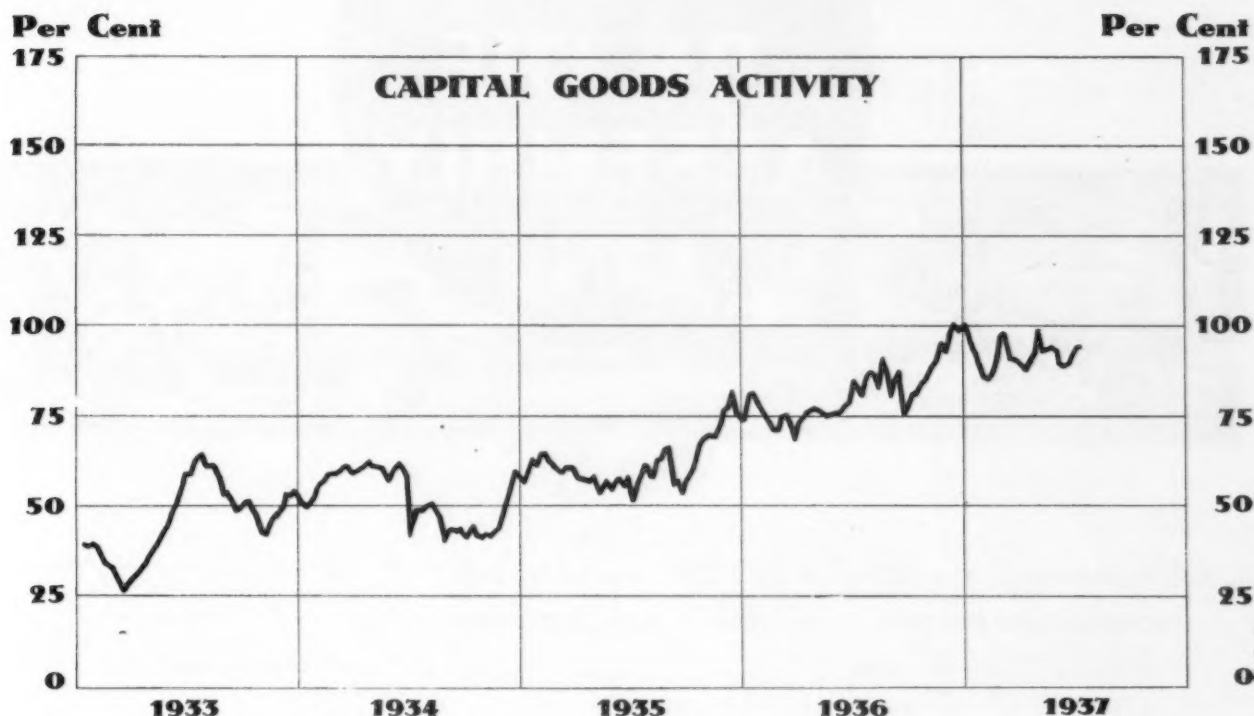
New Departure Honors Men of Long Service

THREE hundred twenty-five employees of the New Departure Division of General Motors Corp. enjoyed a banquet and an evening of goodfellowship on July 8 as guests of the management. All present had served 20 years or more with the company and were presented with gold service buttons designating the number of years of service. Those having served more than a quarter-century (123 in all) received Hamilton presentation pocket watches appropriately inscribed.

As was brought out by General Manager F. G. Hughes in his address to the gathering, the 325 present had accumulated over 8000 years of experience in the manufacture of New Departure ball bearings.

Emphasizing the small turn-over and the very satisfactory employee relations, Mr. Hughes further stated that the 8016 New Departure employees at Bristol and Meriden, Conn., had an aggregate service record of 53,182 years, or an average per employee of 6.6 years..





The Iron Age Weekly Index of Capital Goods Activity

(1925-27 = 100)

Last week	94.4	Same week 1934	48.6
Preceding week	94.1	Same week 1933	62.9
Same week last month	87.9	Same week 1932	35.6
Same week 1936	93.5	Same week 1931	62.5
Same week 1935	55.4	Same week 1930	94.6
Same week 1929		128.7	

ACTIVITY in the production and distribution of durable goods showed a fractional gain for the week ended July 10, when allowance is made for the holiday, according to THE IRON AGE seasonally adjusted index. Automotive production declined 18.5 per cent, for example, but showed a slight gain upon the basis of a work week of four days and an even greater gain when seasonal trends are allowed for. A gain of 21 per cent in heavy construction awards brought up the 13-week moving average, and helped offset losses in the Pittsburgh indices and the lower ingot rate. The gain of 5 per

cent in car loadings of lumber products is against the seasonal trend, but the figure used is for the week ended July 3 and hence is not corrected for the holiday.

	Latest Week	Change from Preceding Week
Steel production (per cent of capacity)	70.0	-6.5
Automobile production (number of cars and trucks)	100,031	-22,859
Railroad loadings of forest products (number of cars) ..	41,723	+1,970
Pittsburgh industrial production and shipments (index number)	103.7	-1.1
Construction contracts awarded (total value)	\$66,998,000	+\$11,520,000

Components of The Index (1) Steel Ingot Production Rate, from THE IRON AGE; (2) Automobile Production, from Ward's Automotive Reports; (3) Revenue Freight Carloadings of Forest Products, from Association of American Railroads; (4) Industrial Productive Activity in Pittsburgh District, from Bureau of Business Research of University of Pittsburgh; (5) Heavy Construction Contract Awards, from *Engineering News-Record*.



... Pre-convention split seen in UAW ranks as left and right-wing caucuses meet at South Bend and Toledo this week end.

o o o

... Ford Motor will probably fight NLRB on constitutional rights through district court up to Supreme Court, as hearing enters second week in Detroit.

o o o

... Ford adds to coke capacity at Rouge and extends Norfolk assembly plant; General Motors makes further extensions in New Jersey.

o o o

... Car price rises in England, including Ford, pre-sale industry-wide increases in 1938 model prices here.

DETROIT, July 12.—The feeling is growing in industrial circles in the Detroit area that the back of the union movement has been broken.

Added to the report of dissension in the union ranks which will come to the direct action stage next month at the UAW convention is the fact that Henry Ford and Tom Girdler have shown that defiance of the CIO can definitely be a winning proposition. Besides that, public sentiment has turned against the unionization drive—as is most powerfully evidenced by the fact that the ear-to-the-ground administration forces, both national and

state, have shown by their remarks and actions that their honeymoon with labor may be over.

A new confidence, to sum it up, has come into the auto industry. No one is so optimistic as to believe that the present period of peace will continue without interruption, but the opinion is expressed on all sides that the checking of the CIO is much more than temporary.

Germer, CIO Organizer, Returns to Detroit

The latest movement in the maneuvering behind the much-vaunted "solidarity" of the union has been

the return of CIO organizer Adolph Germer to Detroit. Germer has for many months been in the Southwest oil fields attending to the unionization drive there. His return to Detroit is interpreted to mean one thing only—that John Lewis is dissatisfied with the dissension in the union ranks—dissatisfied with the leadership of Homer Martin, who is more conservative than he would have him—and about decided to arrange matters so that Martin will be ousted from office at the time of the UAW convention in Milwaukee.

Germer is ostensibly in Detroit to open a district CIO office. What appears to be in the cards is a gradual shifting of authority from the office of President Martin into the hands of Germer, who will in the meantime be consolidating the left-wing forces which are in revolt against Martin. These left wingers are headed by Vice-presidents Wyndham Mortimer and Ed Hall and the demoted Flint organizer, Robert Travis. Martin's most important supporter is the organizational director of the union, Richard Frankenstein.

Meanwhile, calls for two union caucuses are out for next week-end—caucuses which, because they fall on the same day, will bring the opposing forces squarely out into the open. At South Bend the Martin bloc will gather. At Toledo the Mortimer-Hall-Travis group will meet. Both "parties" will map strategy for winning control of the UAW at the convention, which starts Aug. 23.

What might have been interesting speculation on the rumblings of revolt within the union was fairly well crowded out of sight during



the past week by the Ford hearing before the National Labor Relations Board.

NLRB Probes Ford Riot

The first week of the hearing was devoted in its entirety to a probe of the Ford riot of May 26, when unionists were beaten at the gates of the Rouge plant while they attempted to distribute organizational literature. One by one the union leaders and their adherents took the witness stand to tell parallel stories of the beatings they underwent. The Labor Board citation declares that the fracas of that date was caused by Ford agents assaulting the unionists. Testimony thus far, all given by pro-laborites, substantiated this charge. One and all, the witnesses proclaimed their innocence of any provocation in the affair. Organizers Frankenstein and Walter Reuther testified they were turning to leave the overpass on which most of the fighting took place, when they were assaulted from behind.

The Labor Board announced that about 70 witnesses will testify in its behalf. Every indication points to a hearing that will last perhaps well into August—and even thereafter the matter is apt to go on for months before final action is completed. The Ford case, some attorneys say, may finally wind up before the Supreme Court on constitutional grounds.

The procedure, in the event the company is found guilty, is for the Labor Board to issue a "cease and desist" order. Then, should the board believe this order is being disobeyed, it can apply to the circuit court of appeals for an injunction backing up its findings. This

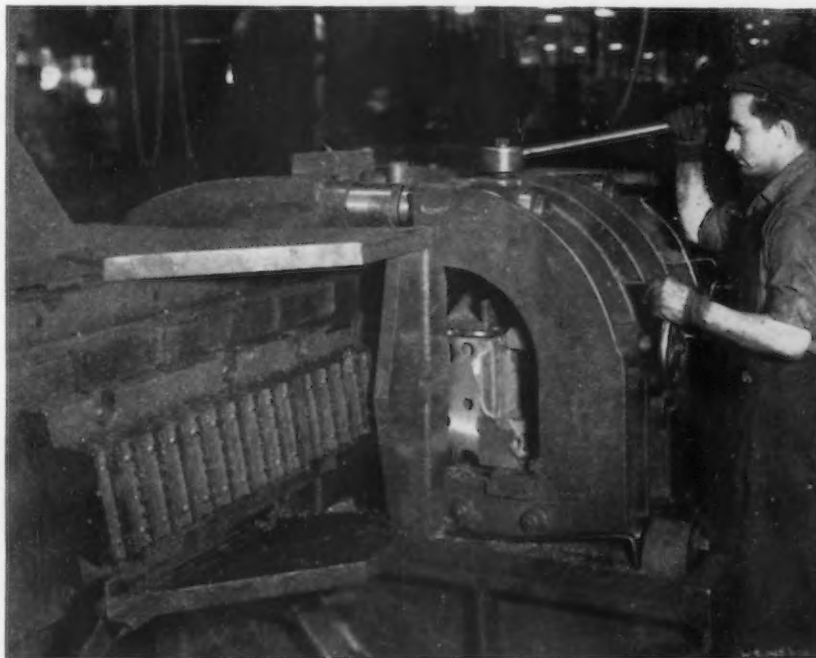
may be the signal for a re-trial of the whole matter in Cincinnati. And, the legal experts point out, the matter may progress from Cincinnati to the Supreme Court.

The Ford company, answering the labor board citation, maintained that constitutionally the board had no authority to intervene as it had in what was described by Ford attorneys as an intrastate transaction between employer and employee. Constitutional rights of free speech and a free press were also cited in answer to the board's

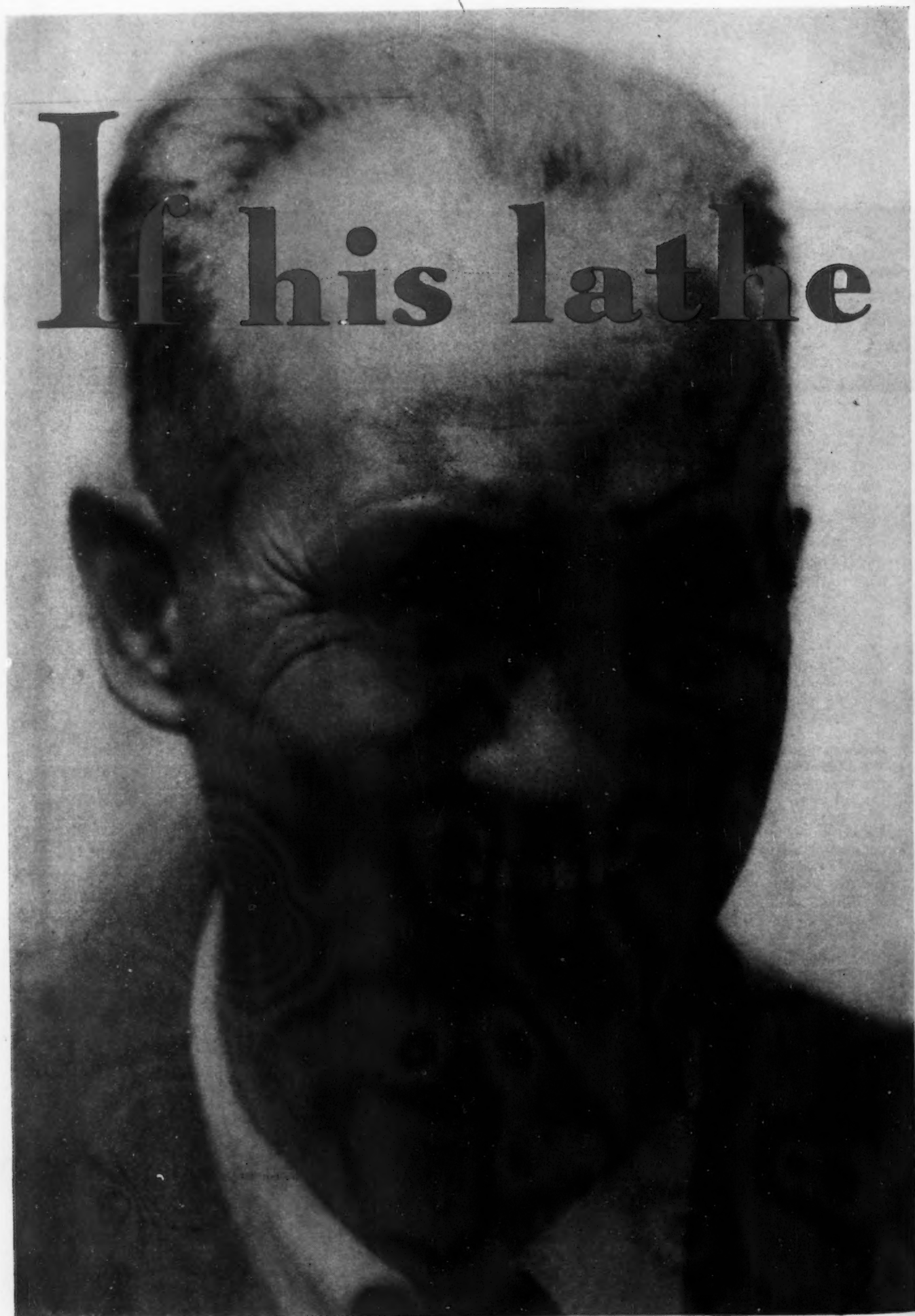
claims of propagandizing against unions on the part of the auto company. It appears certain that such constitutional objections will be fought through every court in the land if a finding favorable to Ford does not come forth. In this respect, the Ford hearing is quite likely to resolve itself into the most important ever held before the board.

Ford Plans Further Expansion

Whatever the outcome, Ford apparently did not seem deterred from

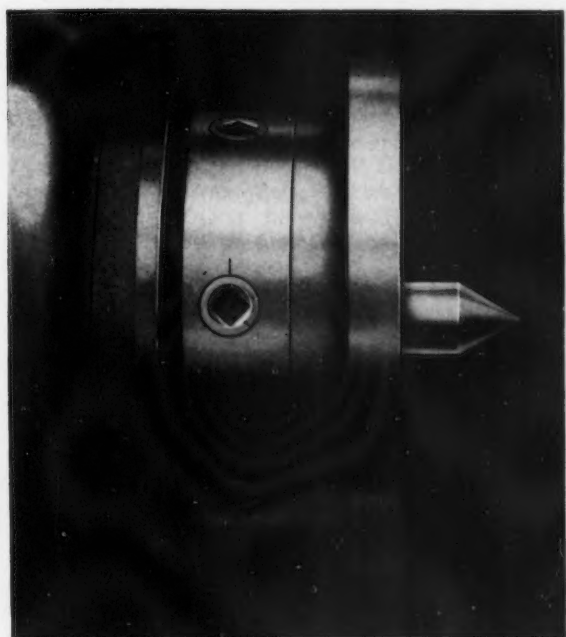


HYDRAULIC broaches have replaced milling machines along De Soto's engine line this year in finishing the manifold side of the cylinder block. The vertical blades on this machine have a cutting speed of 26 ft. per min., finishing a block in slightly over a minute's time. The use of these broaching machines gives a smoother and more uniform surface, permitting better manifold fit.



*An advertisement featuring one
of the many advantages of the
P&W Cam-Lock Spindle Nose*

could smile



This is the Pratt & Whitney Cam-Lock Spindle Nose with a face plate mounted in place. It has the advantage of tremendous rigidity in holding the face plate or chuck on the spindle, with no chance of a throw-off if the spindle is stopped suddenly. It is permanently accurate in holding the chuck central and square. Mounting or unmounting a chuck or face plate is easier on this spindle nose than on any other known type.



PRATT & WHITNEY

DIVISION NILES-BEMENT-POND CO.

HARTFORD, CONN.

... it would show the same tooth preservation

That is why he smiles. His lathe gear teeth will retain their initial accuracy without costly servicing. They will not have to take the heavy pounding a threaded spindle nose used to get every time a chuck or face plate was taken off. *The P&W Cam-Lock Spindle Nose has stopped all that.*

With a threaded spindle nose you have to lock the gears against each other and then sock the face plate to loosen the threads. You might just as well use a steel hammer on the gear teeth. What good then is the fine accuracy of those ground spindle gear teeth? One sock and away it goes. Sock often enough—as you must—and the lathe becomes noisy and puts gear marks on the work. You won't actually knock out any teeth, but you certainly will destroy the precision the manufacturer put there.

With the P&W Cam-Lock Spindle Nose there are no spindle threads. Cams working against six notched studs lock the face plate or chuck solidly in position. These cams are tightened or loosened with a wrench—hand tight only. There is no possibility of spoiling gear tooth accuracy because no blow is needed.

The Cam-Lock Spindle Nose is standard on all Pratt & Whitney Lathes, and has been made available to any lathe manufacturer. Find out about it. We will send complete information to any interested executive.

announcements of further expansions. Improvements to cost about \$2,250,000 were announced late last week. The company gave out word of the award of a contract to the Koppers Co., of Pittsburgh, for construction of an additional battery of 61 coke ovens at the Rouge. The Koppers contract totals about \$1,200,000, and covers construction of the coke ovens above the foundations. The new battery will amplify the Rouge plant supply of fuel gas used for the most part to

feed melting and heat-treating furnaces by increasing the present available supply 25 per cent to some 40,000,000 cu. ft. daily. The primary consideration leading to the building of the new battery was the need for additional fuel gas supplies to maintain peak production at certain seasons—another indication of Ford's determination to make the plant as nearly self-sufficient as possible.

The total cost of the new ovens and accessory equipment will run

to about \$550,000 in addition to the Koppers contract.

Another half million dollars will be expended by Ford in expansion of the Norfolk, Va., tidewater branch assembly plant. This program is to start shortly, and will increase plant peak production by 50 cars to about 400 daily. The new addition will nearly double the size of the present plant, and will add 250 men to capacity employment. The building expansion will measure 520 by 300 ft., and will include a 400-ft. dock running into the Elizabeth River.

G.M. to Build Another Jersey Plant

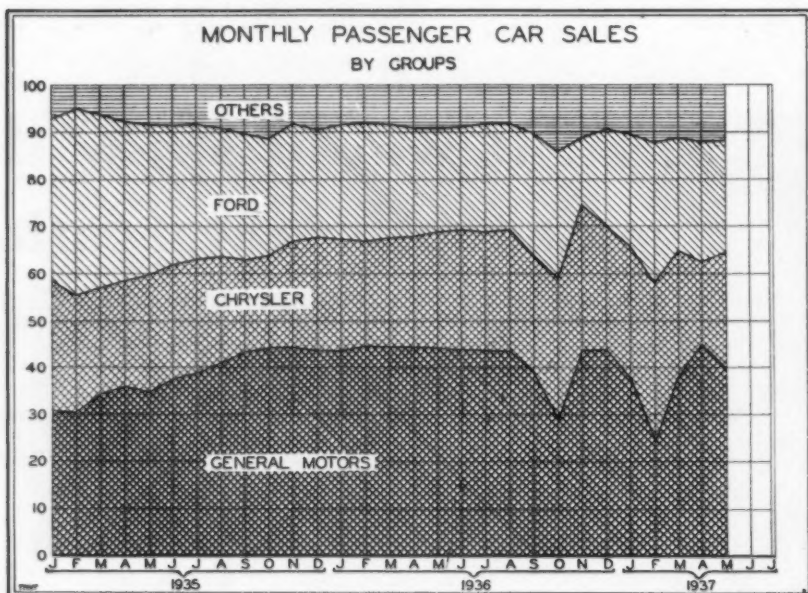
General Motors announced another expansion during the week also, in the form of an Eastern service plant to be built for the Inland Mfg. Division at Cranford, N. J. It is the third G.M. building project to be announced for New Jersey this year—and industry observers at once pointed to the fact that New Jersey is the State where Governor Hoffman said sitdown strikes would not be tolerated. More and more it becomes evident that the Middle West, and especially Michigan, will suffer bitterly in years to come for the extreme measures which have been taken by its labor leaders of today.

The pace of the industry is beginning to slow up. Production slipped sharply last week as a result of the Independence Day holiday, Monday, to 100,031 units, compared with the previous week's 122,890. A year ago that week output was 100,648—in a five-day working period, however. These are the estimates of Ward's Automotive Reports, which predicted a rise to about 115,000 jobs this week, and definite seasonal decline thereafter. Ford is definitely scheduled to close on July 15 after moving his original two-week vacation plans a week forward. This will shave about 25,000 units weekly from current production totals. Thereafter the independents, one by one, will be closing down, and the larger producers will be slicing schedules in preparation for changeover time.

Ward's said that orders in most factories will be caught up by the end of this month, and thereafter all output will be solely to stock up dealers during changeover period. Sales are said to be easing off in many sections—more definitely, perhaps, in the truck field than in the pleasure car section of the industry.

Even though changeover time is only a month or so ahead in almost all plants, few commitments for 1938 model needs have yet been

(CONTINUED ON PAGE 71)



Percentages of Passenger Car Sales in Five Months of 1937

1935—	General Motors	Ford	Chrysler	Others	Total
January	30.57	33.97	27.10	8.36	100.00
February	30.40	38.14	24.82	6.64	100.00
March	34.52	36.38	22.56	6.54	100.00
April	36.80	33.06	22.30	7.84	100.00
May	34.93	31.95	24.55	8.57	100.00
June	37.86	29.76	23.77	8.61	100.00
July	38.68	29.22	23.57	8.53	100.00
August	41.95	26.39	22.64	9.02	100.00
September	43.30	27.93	18.58	10.19	100.00
October	44.00	25.89	18.47	11.64	100.00
November	44.03	25.77	22.11	8.09	100.00
December	43.61	23.35	23.38	9.66	100.00
1936—					
January	43.87	23.88	23.70	8.55	100.00
February	44.37	25.14	22.20	8.29	100.00
March	44.79	23.33	23.44	8.44	100.00
April	44.91	22.08	23.92	9.09	100.00
May	44.43	22.04	24.12	9.41	100.00
June	43.94	22.13	24.91	9.02	100.00
July	43.49	23.22	24.83	8.46	100.00
August	43.22	23.06	25.32	8.40	100.00
September	38.89	26.73	24.18	10.20	100.00
October	28.45	27.72	29.23	14.60	100.00
November	44.27	13.14	31.12	11.47	100.00
December	44.48	19.99	25.53	10.00	100.00
1937—					
January	37.80	24.57	27.44	10.19	100.00
February	24.53	29.54	33.16	12.77	100.00
March	37.53	24.29	26.55	11.63	100.00
April	44.50	26.35	17.10	12.05	100.00
May	39.98	24.00	24.33	11.69	100.00

Current Metal Working Activity Statistically Shown

These Data Are Assembled by The Iron Age from Recognized Sources and Are Changed Regularly as More Recent Figures Are Made Available. Boldface Type Indicates Changes This Week

	May, 1937	April, 1937	May, 1936	Five Months, 1936	Five Months, 1937
Raw Materials:					
Lake ore consumption (gross tons)*.....	5,321,011	5,114,117	3,882,173	15,849,207	24,715,312
Coke production (net tons) ^b	4,798,511	4,655,226	3,838,923	17,507,589	23,216,313
Pig iron:					
Pig iron output—monthly (gross tons)*.....	3,537,231	†3,391,665	2,648,401	10,887,986	16,599,087
Pig iron output—daily (gross tons)*.....	114,104	†113,055	85,432	71,631	109,928
Castings:					
Malleable castings—production (net tons) ^d ...	55,960	63,377	45,027	230,326	297,829
Malleable castings—orders (net tons) ^d	57,327	62,940	44,136	230,287	294,990
Steel castings—production (net tons) ^d	95,995	†105,475	64,246	271,259	495,322
Steel castings—orders (net tons) ^d	68,688	†99,672	63,950	329,199	537,091
Steel Ingots:					
Steel ingot production—monthly (gross tons)*.	5,135,559	5,071,875	4,037,375	17,300,528	24,580,871
Steel ingot production—weekly average (gross tons)*.....	1,163,332	1,182,255	911,371	796,525	1,139,058
Steel ingot production—per cent of capacity*.	88.82	90.27	69.6	60.78	87.1
Finished steel:					
Trackwork shipments (net tons)*.....	8,807	9,888	7,314	28,085	44,814
Sheet steel sales (net tons) ^e			191,511	946,647	
Sheet steel production (net tons) ^e			224,056	1,064,210	
Fabricated shape orders (net tons) ^f	118,842	148,152	145,553	629,589	728,831
Fabricated shape shipments (net tons) ^f	130,714	136,042	134,623	537,774	611,881
Fabricated plate orders (net tons) ^d	28,545	†42,455	51,443	178,470	216,044
U. S. Steel Corp. shipments (tons) ^h	1,304,039	1,343,644	984,097	4,145,285	6,345,724
Ohio River steel shipments (net tons) ⁱ	102,200	101,720	86,004	356,166	510,590
Fabricated Products:					
Automobile production, U. S. and Canada*...	540,357	553,415	480,571	2,125,422	2,396,081
Construction contracts, 37 Eastern States ¹	\$244,112,800	\$270,125,200	\$216,070,700	\$1,004,676,100	\$1,176,377,200
Steel barrel shipments (number) ^d	786,607	970,749	730,784	3,194,647	4,393,791
Steel furniture shipments (dollars) ^d	\$2,258,814	\$2,462,687	\$1,451,199	\$7,741,223	\$11,483,169
Steel boiler orders (sq. ft.) ^d	1,005,591	674,248	723,343	3,530,731	4,701,856
Locomotive orders (number) ^m	14	84	10	98	206
Freight car orders (number) ^m	3,903	13,046	9,677	22,234	44,562
Machine tool index ⁿ	208.5	282.5	118.9	†116.6	†234.2
Foundry equipment index ^o	237.6	208.1	165.4	†138.1	†248.1
Foreign Trade:					
Total iron and steel imports (gross tons) ^p		68,197	59,391	259,235	
Imports of pig iron (gross tons) ^p		11,469	15,296	80,714	
Imports of all rolled steel (gross tons) ^p		39,239	20,994	108,053	
Total iron and steel exports (gross tons) ^p	1,043,489	671,746	314,950	1,331,714	2,790,426
Exports of all rolled steel (gross tons) ^p	279,699	197,327	93,944	433,398	901,148
Exports of finished steel (gross tons) ^p	164,192	174,143	84,591	398,238	731,382
Exports of scrap (gross tons) ^p	630,671	421,383	213,366	858,670	1,620,114
British Production					
British pig iron production (gross tons)*.....	696,300	680,700	661,000	3,105,000	3,311,700
British steel ingot production (gross tons) ^r ...	1,047,300	1,080,400	963,000	4,778,300	5,232,000
Non-ferrous Metals:					
Lead production (net tons)*.....	40,192	43,908	41,551	185,197	208,829
Lead shipments (net tons)*.....	55,212	55,200	33,125	178,001	269,930
Zinc production (net tons) ^t	55,012	†52,099	44,905	208,785	230,064
Zinc shipments (net tons) ^t	55,201	56,229	43,977	210,833	269,245
Deliveries of tin (gross tons) ^v	6,425	6,995	5,235	29,225	37,890
Copper production, refined (net tons) ^w	95,265	83,178	59,374	748,660	401,449

* Preliminary. † Three months' average. ‡ Revised.
Source of figures: * Lake Superior Iron Ore Association; ^b Bureau of Mines; ^c THE IRON AGE; ^d Bureau of the Census; ^e American Iron and Steel Institute; ^f National Association of Flat-Rolled Steel Manufacturers; ^g American Institute of Steel Construction; ^h United States Steel Corp.; ⁱ United States Engineer, Pittsburgh; ^j When preliminary from Automobile Manufacturers Association—Final figures from Bureau of Census; ^k F. W. Dodge Corp.; ^l Railway Age; ^m National Machine Tool Builders Association; ⁿ Foundry Equipment Manufacturers Association; ^o Department of Commerce; ^p British Iron and Steel Federation; ^q American Bureau of Metal Statistics; ^r American Zinc Institute, Inc.; ^s New York Commodities Exchange; ^t Copper Institute.

WASHINGTON.



By L. W. MOFFETT

Resident Washington Editor,
The Iron Age

... Hearings on bill to license scrap exports, expected soon, promise spirited battle between scrap exporters and steel companies.

... Report of Senate Committee on Post Offices on CIO interference with mails not yet submitted; Senator Bridges may carry criticism of Farley to floor of Senate.

... John L. Lewis, smarting under defeat of CIO in steel strikes, takes a "public be damned" attitude in conference with press; William Green brands CIO a failure in steel campaign.

WASHINGTON, July 13.—All signs point to a voluminous pro and con presentation at hearings on the so-called Schwellenbach-Kopplemann bill to license exports of iron and steel scrap. Senator Thomas, chairman of a sub-committee of Senate Committee on Military Affairs, which is handling the measure on the Senate side, had intended to have hearings under way by this time. But like other legislation, action on the scrap bill has been held up by the Administration's court packing bill. The latter promises to be before the Senate a long time inasmuch as each side has dug in to fight it out if it takes all summer—or longer. So if promised hearings on the scrap bill are withheld until the court packing bill is disposed of, then they may be expected to come along with the dog days. However, there is a bare possibility time will be found to sandwich in the scrap bill hearings during the cat and dog scrap over the bill to subject the Supreme Court to the status of a rubber stamp for the White House.

The proposed scrap legislation itself has generated a great deal of warm discussion, written and oral, and the points made by opposing sides are expected to be

brought to a sharp focus at the hearings. It is reported that the steel companies and foundries, which are strongly urging passage of the legislation, and scrap dealers, who are vigorously opposing its passage, have gathered and duly documented a wealth of material to submit to the Senate committee. Each side appears to be confident of victory.

Melters who are asking for the legislation claim it has support in certain administrative circles as well as in Congress. Heavy exports of scrap, much of which are said to be going into armament programs abroad to feed the maw of Mars; draining of domestic supplies of raw materials, and mounting prices, reflected in high steel costs—are some of the points that appeal to those supporting the legislation.

Republic Steel Calls Scrap Exports "Appalling"

In a letter to the House and Senate Committees on Military Affairs, the Republic Steel Corp., said that present scrap exports are "appalling" and estimates they will reach between 3,000,000 and 4,000,000 tons in 1937; that if the present rate of exports is continued the

supply may be found insufficient to meet needs for national defense in case of emergency; that scrap exports are costing the steel industry between \$80,000,000 and \$100,000,000 annually; that if exports were discontinued scrap dealers would be hurt little, if any, because they would ship the same tonnage at perhaps the same average profit to domestic consumers. Republic added that it cannot see how American labor would be affected at all if exports were stopped "as the tonnage would then be shipped for domestic consumption." If the unprecedented scrap exports of 638,108 tons in May were to continue for the remainder of the year, the Republic estimates of 1937 foreign shipments would prove to be too conservative by far.

On the other side of the picture scrap dealers insist there is no threatened scarcity; that it is a question of price based on demand and supply; that only 20 per cent of the scrap exported is of the grades domestic melters would buy; that large quantities are being gathered for export, which in the absence of foreign demand would not be gathered, such as junked automobiles; that a licensing bill is discriminatory in that shipments would be unfairly restricted from



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GENERAL OFFICE: GRANT BLDG., PITTSBURGH, PA.

WORKS: CARNEGIE, PA.

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200 GIRARD TRUST CO. BLDG., PHILADELPHIA, PA. 4015 CHRYSLER BLDG., NEW YORK CITY, 1017 FISHER BLDG., DETROIT, MICH. 122 S. MICHIGAN BLVD., CHICAGO, ILL. STEEL SALES CORPORATION, 129 S. JEFFERSON ST., CHICAGO, ILL. H. L. BROWN, 2001 CAREW TOWER, CINCINNATI, OHIO. BRUCE DONALD, BRANTFORD, ONT., CANADA. J. J. BYRNE, AVENUE BLDG., 4500 EUCLID AVE., CLEVELAND, OHIO.

BRACE-MUELLER-HUNTLEY, INC.

130 SOUTH ELMWOOD AVE., BUFFALO, N. Y. 983 LYELL AVE., ROCHESTER, N. Y. HILLS BLDG., SYRACUSE, N. Y.

certain sections to the advantage of other sections. They also point to the sharp rise in May exports of pig iron (117,598 tons), ingots, blooms, billets, etc., (24,480 tons) which, it is argued, are intended for armament programs in the same degree that exported scrap is used for that purpose. Hence, they contend, that if scrap exports are to be licensed, pig iron and steel, and for that matter an endless list of products should likewise be subjected to license. For it is urged

almost every conceivable product can be classified as a military necessity.

This latter attitude is partially represented in the broadened bill being drafted by Representative Kopplemann who proposes licensing of pig iron and other metals along with scrap.

Scrap dealers are pleased with the report of the Inter-departmental Committee, headed by Secretary of State Hull, and the report of Secretary of Commerce Roper op-

posing the legislation. Steel and foundry interests who are supporting the legislation are pleased with reports of Secretary of the Navy Swanson and Secretary of War Woodring favoring enactment of such legislation.

Welders Ask for 25-Hr. Week

CIO irresponsibility with respect to contracts is matched by its irresponsibility in making statements. And in this connection the welding industry ought to be interested with a view to combating a statement recently made before the Senate Committee on Education and Labor by the United Aircraft Welders of America, CIO affiliate, that "aircraft welders have an average working life of less than 12 years" due to inhalation of poisonous gases. The statement was filed by James Goss, business representative of the union, who claims to represent one third of 100,000 welders in the industry and wants the Black-Connery wage-hour bill to provide for a 25-hr. minimum workweek for welders on the ground that the workers' health would not permit longer working hours. Officials of the Labor Department's Division of Labor Standards have characterized as "exaggerated" the life expectancy claim. The demand for the 25-hr. week of course was disregarded by the Senate committee in its revised wage-hour bill.

While definitely placing welding in the category of hazardous occupations, they pointed out that alloys of aluminum used in aircraft construction are nontoxic metals and that if a study of the problem disclosed that workers became "complete physical wrecks" after 12 years of welding, it would be "most surprising." The division had been requested by the union's representative to undertake a study of the occupational hazard but was assured by officials that every precaution was being taken by employers to safeguard the health of employees. They indicated to THE IRON AGE that further study should be conducted by the Public Health Service if conditions were found to warrant investigation.

U. S. Mail Case Not Closed

Members of the Senate Post Office Committee just can't get together on what they want to tell the Senate about the recent investigation of mail interference by CIO pickets at Ohio plants of the Republic Steel Corp.

Chairman McKellar, who characteristically went to the defense of the Post Office Department from the beginning of the inquiry, was apparently the only one who knew just what the committee should say



American MonoTractor reduces cost of handling heavy castings.

This rubber drive wheel, geared to an electric motor, is inflated against the bottom of the rail. The increased tractive contact of rubber against steel creates tremendous draw-bar pull. Many interesting applications are described in a new book now available. Write for a copy.

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AMERICAN MONORAIL CO.

13103 Athens Ave., Cleveland, O.

about the affair. He went ahead and prepared a voluminous report. McKellar thought it was a magnum opus. It was frowned on by other committee members, frozen-faced to the literary effort. Now he has named two other members to do the drafting.

A scorching minority report is being written by Senator Bridges, Republican of New Hampshire, which will reach the Senate floor simultaneously with the majority report. Bridges, who didn't have a thing to do with the disagreement with McKellar's draft since he is not a party to the majority report, was the sponsor of the resolution which launched the mail interference inquiry.

Bent on further bearing down on the committee in its refusal to call the Postmaster General for questioning, Bridges is understood to be planning to introduce new evidence on the floor of the Senate and will ask the committee-immunized Farley the questions publicly which the Senator was prevented from asking in person.

Before the committee finally voted to drop the inquiry, Bridges termed Farley the "logical witness" and indicated his intention was to question the New Deal generalissimo and Postmaster General about the "discretionary" power in accepting certain packages for delivery to the strike-affected plants in Ohio and refusing food and clothing shipments.

When the New Hampshire Senator gets the floor he will raise the question of contributions made to the Democratic National Committee by the CIO and Labor's Non-Partisan League, both under the domination of John L. Lewis. Bridges' contention is that Farley, in his dual role of Postmaster General and chairman of the Democratic National Committee, is under direct obligation to the Lewis crowd, and that his action in the strike situation may have been based accordingly. But say what one will, Jim Farley is a political armadillo and a shot bounces off of him like a BB would bounce off a warship.

Lewis Smarting Under Defeat

Whether or not John L. Lewis has been forced to beat a retreat back to the coal mines over the wreckage of his grandiose CIO, as President William Green of AFL affects to believe, it is certain Lewis has pulled a superlative boner that might well speed him in that direction. For Lewis, as if smarting over his unsuccessful sieges against steel companies and the Ford Motor Co. and the strong swell of hostile public opinion, has taken a "public be damned" attitude.

Breaking a protracted silence, Lewis vented his feeling against the public last Wednesday at a press conference when he was asked if he had any comment on the unsympathetic trend against CIO as reported by the Institute of Public Opinion poll.

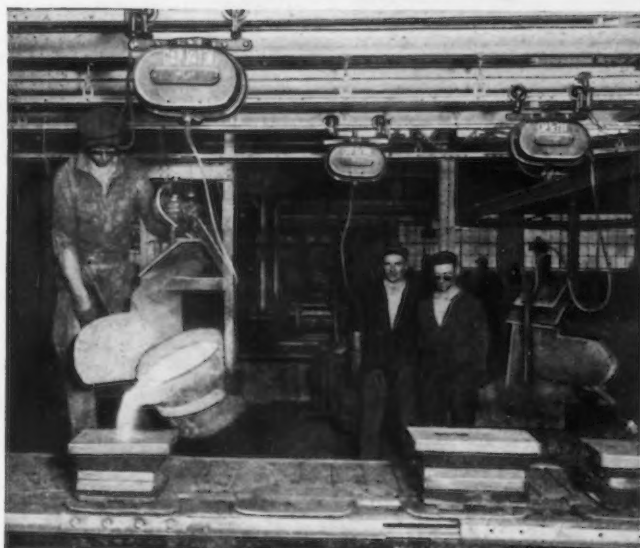
"If the public wants to approve the CIO it can; if it wants to disapprove it, it can," the irritated Lewis brusquely replied.

A much more famous and power-

ful man than Lewis paid a heavy price for having said or having the words put in his mouth: "The public be damned."

Most definitely no person or organization, not excluding John L. Lewis or CIO, can prevail against organized public opinion, a fact that has been proven numberless times. Lewis himself is perfectly aware of the value of public opinion as shown by his appeal to it in the past. But in his reckless CIO drive he cast aside this necessary

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Loads of 500 pounds or under are still being HAND-led by manpower or with inadequate mechanical assistance. In many of these cases a 1/4-ton Lo-Hed Hoist would not only release a man but do the work far better and faster at, of course, a saving. For example, in one foundry, 1/4-ton Lo-Hed Hoists operated by one man are used

for pouring along mold conveyors. The operator can devote all his attention to maneuvering the spout into the right position for the important job of pouring. Look into the possibilities of the 1/4-ton Lo-Hed and of the other 98 standard Lo-Heds. Send coupon for new Lo-Hed catalog.

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Your Title _____

asset and as if laboring under a psychosis of desperation has broken out against the public. It smacks of a snarling confession of defeat, not masked by announcement of the drive to organize 300,000 maritime workers.

Mr. Green shrewdly sensed the import of the Lewis blunder and on the heels of it issued a pointed statement branding the CIO as a failure in the steel strikes, unsuccessful in its first objectives and condemning Lewis and his CIO colleagues for doing more to injure the cause of organized labor than any hostile employer in the United States.

Speaking from the experience of years of labor leadership, Green unerringly put his finger on a fatal weakness of CIO when he said it had antagonized public opinion by its violent tactics in the automobile and steel industries. This reason for CIO failure in the steel strike was ranked next to another reason, that only a minority of the workers were organized when the strike was called. Mr. Green might have added that the minority still remains a minority and were it not for coercion and intimidation the present minority would be even less than it is. As to the Lewis brainstorm about public sentiment, he might have been reminded of the old saw: "Whom the gods would destroy they first make angry."

U. S. Sells 27 Ships; 10 to be Scrapped

WASHINGTON, July 13.—Approximately 19,000 tons of steel scrap will be recovered from 10 old ships awarded last Friday by the Maritime Commission to three American firms. The Northern Metal Co., Philadelphia, on a bid of \$101,024.93, was awarded six ships whose scrap salvage is estimated at about 8400 tons; the Hyman-Michaels Co., Chicago, was awarded three ships at \$125,330, estimated to produce about 9800 tons of scrap, while one ship went to the Hoyne Industrial Salvage Co., Chicago, at \$6,160, estimated to produce about 1500 tons of scrap.

Of the 27 ships sold, 17 went to foreign purchasers and most, if not all, of them are to be continued in operation. Under the terms of the contracts they are barred from operating in United States coastal waters within a period of 10 years. Bids on the remaining ship, the Kittery, were rejected. The Kittery will be readvertised for sale.

PERSONALS.

N. F. MELVILLE has been appointed manager of manufacturers' wire and stainless steel wire sales, Pittsburgh Steel Co., Pittsburgh. He has been sales representative for Pittsburgh Steel since 1927, except for a period of about two years when he was chief metallurgist of Rotary Electric Steel Co., Detroit. Mr. Melville received his technical training in metallurgy at Carnegie Institute of Technology after which he joined the metallurgical staff at Carnegie Steel Co., Homestead works (now Carnegie-Illinois Steel Corp.). In 1921 he became chief metallurgist of Columbia Steel Co. at Elyria, Ohio, and later at Pittsburgh for both Elyria and Butler plants. In 1926 he joined the Superior Steel Corp. at Carnegie, Pa., as chief metallurgist.

A. J. PADDOCK, assistant manager, American Bridge Co.'s, Elmira, N. Y., plants, will succeed H. L. RANKIN as manager when the latter leaves to take charge of the company's Trenton, N. J., fabricating plant which is to be reopened as soon as possible.

DONALD C. BAKEWELL, who recently became affiliated with the Blaw-Knox Co., Pittsburgh, has been elected a vice-president.



H. F. BOE, whose appointment as commercial manager of the Westinghouse Electric & Mfg. Co. was announced in these columns last week.

CHARLES P. FRANCHOT has been elected president and general manager of the Burden Iron Co., Inc., Troy, N. Y. JOSEPH W. BURDEN has been made chairman of the board. O. A. VAN DENBURGH, JR., has been elected vice-president in charge of operations and HAROLD T. HENRY, vice-president and general sales manager.

MITCHELL M. FREY, JR., who has been continuously identified with William B. Scaife & Sons Co., Oakmont, Pa., for almost 48 years, has resigned as secretary and treasurer of the company, but will continue as a member of the board of directors. ARCHIE V. MURRAY has been elected secretary and treasurer.

SIMEON JESTER, JR., formerly with the sales department of the American Engineering Co., Philadelphia, has been transferred to the Chicago office of the company. He is a graduate of Massachusetts Institute of Technology and has been identified with the company for the past two years.

GEORGE P. BROCKWAY, purchasing manager of the American Optical Co., Southbridge, Mass., has been elected president of the National Association of Purchasing Agents. A graduate of the engineering school of Cornell University, he spent several years in the engineering department of Cutler-Hammer, Inc. In 1918 he was appointed purchasing agent and held this office until he joined the American Optical Co. in 1923 as purchasing manager.

E. E. HORN has been placed in charge of appointing jobbers in North and South Carolina, Georgia and Florida for the sale of the entire line of the Roots-Connersville Blower Corp., Connersville, Ind. GEORGE P. SCHUMACKER, Cleveland, has been placed in charge of distribution in some of the northeastern counties, Ohio, comprising the Cleveland area. CHESTER E. WING is supervising turbine sales in adjacent counties of Ohio, Indiana and Kentucky. JAMES T. CASTLE, Pittsburgh, through his associate D. J. MCCONNELL, has charge of sales of turbines in the western part of Pennsylvania, as well as in bordering counties of Ohio and West Virginia, and E. A. MCCALLUM, San Francisco, is responsible for distribution in the northern half of California.

WILLIAM C. BAIRD, secretary and treasurer of the Buffalo Pipe & Foundry Corp., Buffalo, has been elected a director of the Manufac-



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E. C. ATKINS AND COMPANY, INDIANAPOLIS, INDIANA

THE IRON AGE, July 15, 1937—69



turers and Traders Trust Co., Buffalo.

❖ ❖ ❖

G. J. DAHLINGER has been appointed chief of the bureau of costs, Carnegie-Illinois Steel Corp., Pittsburgh. He succeeds W. P. MARQUIS, who was transferred to the Irvin works as works auditor. R. W. MAY succeeds Mr. Dahlinger as assistant chief, bureau of costs.

❖ ❖ ❖

H. G. WARWICK, who resigned effective July 1 as treasurer of the

Corey Steel Co., Chicago, is now in business for himself under the name of the Warwick Steel Co. with offices at 2400 West Madison Street, Chicago. The principal lines will be sheets and strip steel.

❖ ❖ ❖

ROBERT H. FULTON, JR., has been appointed secretary and treasurer of the Aluminum Goods Mfg. Co., Manitowoc, Wis., to fill the vacancy caused by the resignation of JOHN F. WALTON, JR., effective July 31. Mr. Fulton joined the Aluminum

Co. of America, Pittsburgh, in 1912, and after 17 years in the Chicago district sales office, was appointed manager of sheet sales. He is a graduate of Washington and Jefferson College. He completed World War service with a Captain's commission.

❖ ❖ ❖

BENJAMIN BOALT, Des Moines, Iowa, has been appointed vice-president of the Perfex Corp., Milwaukee, manufacturer of automatic controls for heating, air conditioning and refrigeration equipment. He formerly was a director and secretary of the old Minneapolis-Honeywell Heat Regulator Corp., Minneapolis, but since 1931 has been a director and vice-president of the Penn Electric Switch Co., Des Moines.

❖ ❖ ❖

GEORGE BROWN has been appointed general purchasing agent for H. C. Frick Coke Co., Pittsburgh, and affiliated companies. He formerly handled the purchasing of coal for the company and will continue this along with his new duties. Mr. Brown started to work with the National Tube Co. and during the war was associated with the Ordinance Department of the corporation when the latter was constructing a munitions department at Neville Island. He started with the H. C. Frick Coke Co. in 1921 as coal purchasing agent. In his new position as general purchasing agent he succeeds THOMAS S. DUNCAN who retired on July 1. MATTHEW S. MAWHINNEY has been named assistant purchasing agent.

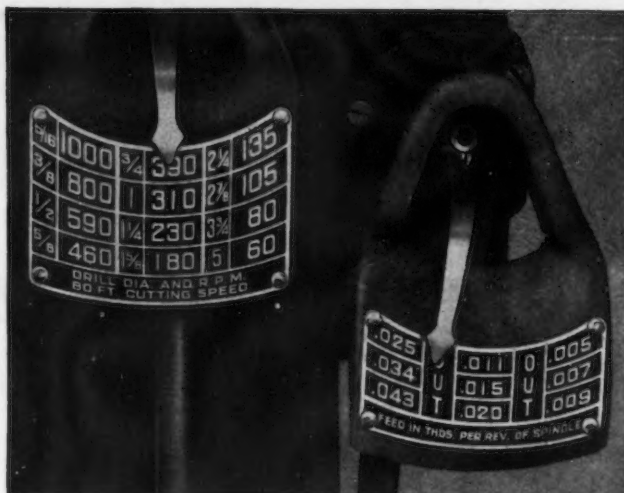
❖ ❖ ❖

L. F. A. MITCHELL has been appointed head of the construction industry section of the Westinghouse Electric & Mfg. Co. Formerly assistant manager of sales for the Canadian Westinghouse Co., Mr. Mitchell has wide experience in the selection and application of electrical equipment in all industries including the construction field. In his new position he will be responsible for making the facilities and engineering services of the company available to the entire construction field including contractors and the company's agent jobbers.

The ninety-fourth meeting of the American Chemical Society will be held in Rochester, N. Y., Sept. 6 to 10. Florus R. Baxter, retired head of the Vacuum Oil Co's research laboratories will be honorary chairman, and M. H. Eisenhart, president, Bausch & Lomb Optical Co., will be general chairman. Seventeen professional divisions of the society have scheduled sessions.

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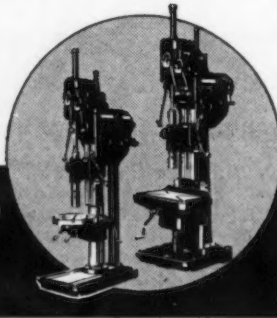
● At the right is shown the feed plate which on the 24" and 28" machines provides 9 rates of feed from .005" to .043" per revolution. On the 21" machine 4 rates of feed are provided.

By providing quick easy selection of feed, closely graded in range,

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Write for Bulletin U-22.



**THE CINCINNATI BICKFORD
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This Week on the Assembly Line

(CONTINUED FROM PAGE 62)

released. Orders for steel and other materials are likely to go forward within the next fortnight, however.

The industry has been interested in news from England that the Ford of England plant has joined with Austin and Morris Motors in a general upward price movement averaging about 5 per cent. The producers on this side, harassed by sharply advancing labor and material costs, are hoping with all their hearts that such a move presages a Ford price increase in this country next fall. With the entire industry in dire need of raising prices on 1938 models, failure of Ford to join in would be well-nigh disastrous. Meanwhile, Alvan Macauley, president of Packard and also of the Automobile Manufacturers Association, predicted on Friday a substantial advance in price for 1938 models as an aftermath of wage increases which he declared added \$100,000,000 to manufacturing costs in the last six months.

Hupp Motor Car Corp. is going to start turning out cars once more on July 20, according to present plans. That date will mark the first movement of the Hupp assembly lines since they went down for lack of operating capital early in 1936. A small number of jobs destined for export only are to be turned out. Meanwhile dies are being completed for the 1938 jobs, which give evidence of developing into a potent force among the independents in next year's market.

Recent developments show that a report published in these columns that the Electro-Motive Corp., subsidiary of General Motors, was "due to abandon its entire present line" of engines for railroad purposes and go to a new type of diesel is not borne out.

Electro-Motive is building an addition to its plant at LaGrange, Ill., to provide additional capacity for the manufacture of the Winton two-cycle diesel engines and there is no thought of changing the type of engine, which is the product of more than seven years of research and development by Winton, Electro-Motive and General Motors Research Laboratories. Operations of the Winton Engine Corp., Cleveland, will be continued in the production of heavy marine and stationary engines for which its entire capacity is required.

An additional General Motors diesel development under way is the construction of a large plant in

Detroit for the newly created Diesel Engine division of General Motors which will manufacture the Winton two-cycle diesels in sizes of from 20 to 160 hp.

Michigan Scrap Trade Signs Wage Contract

AN open shop agreement for six months was signed last week by the Michigan chapter of the Institute of Scrap Iron and Steel

and the United Automobile Workers, an affiliate of the CIO. The agreement provides for a minimum wage of 50c. per hr., with higher wages for various classifications, and for a 50-hr. week, divided into five days of 9 hr. each and 5 hr. on Saturday, with time and a half for overtime.

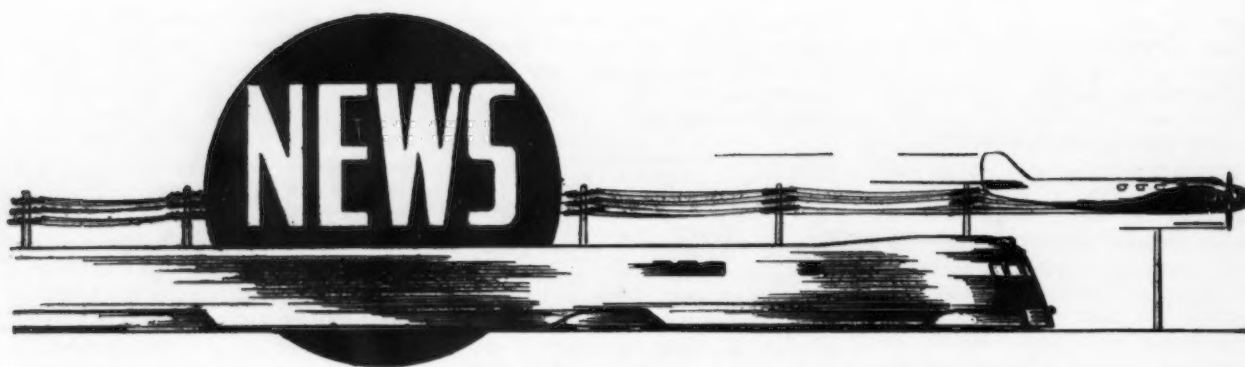
A similar open shop agreement was signed recently by the New York chapter of the institute with the AFL, providing for a minimum wage of 45c. an hr. and a 45-hr. week.



—are manufactured to the highest standards—give a maximum of satisfactory service. The complete line—including popular types of detachable and pintle chains, steel chains for heavy drives, bearings, take-ups, sprockets and elevator buckets—is listed in Bulletin No. 74. Send for a copy... then, you too can get prompt shipment from this centrally located source. Let Bartlett-Snow serve your power transmission requirements!

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British Propose \$5,000,000 Fund to Expand Exports, Maintain Price Level

LONDON, July 13, (By Cable).—The Government steel industry report includes recommendations for the establishment of a stabilization fund. An initial £1,000,000 will probably be raised by a levy on pig iron and raw steel output. This fund is to assist the expansion of exports, the maintenance of reasonable price levels by giving grants to certain high cost units, and the elimination of redundant and inefficient plants. It will also assist research. The report suggests an inquiry into the dock transport charges.

New business is quiet, but there is full activity at the plants. The tariff reductions so far have not improved the supply position, but the British Federation has negotiated with the cartel for 30,000 tons of sheet and tin plate bars over the quota, and is now negotiating for an additional 200,000 tons of rolled steel, including 100,000 tons of semi-finished steel.

There is no foundry pig iron

available for export. Some hematite has been shipped abroad under old contracts, but new business has been refused.

The tin plate market is firm, but business is handicapped by the shortage of steel. Prompt early shipment is difficult to obtain and makers are reluctant to quote far

forward as steel is expected to be dearer.

Business in black and galvanized sheets is quiet because of the shortage of the steel supply, but inquiry, mostly for home account, is strong.

Continental export demand is quieter and delivery delays are shortening. What business that has been done has gone to the works able to promise the earliest shipment. Premiums over official rates plus obligatory premiums have virtually disappeared.

British and Continental prices are unchanged.

British Initiate Search for Scrap

LONDON (Special Correspondence).—In an effort to remedy the present acute shortage of iron and steel scrap, the British Iron and Steel Federation has inaugurated a nation-wide search for metal believed to be lying idle. An appeal is being made to households and private works and estates to surrender any scrap they may have in their possession.

In initiating the appeal, the federation states that an incalculable but certainly enormous tonnage of scrap is believed to be lying idle, and adds: "The regular use of scrap in steelmaking implies the conservation of our invaluable coal and iron ore resources."

At the same time, General Goering has announced that an inventory is to be made in Germany of all the iron and steel in the country. Any person possessing more than 10 tons of either iron or steel is required to make a report to the appropriate authority by July 15.

NEWS AND MARKET INDEX

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Sees Decline of CIO As Industrial Factor

ALREADY past the peak of its development as a mass movement, the CIO is declining as a factor in the industrial pattern of the United States. If the CIO survives at all it will be only because it abandons its class philosophy

and more closely approximates the "middle class" theory of the American Federation of Labor. Even merger with the AFL may be necessary if the CIO is to survive.

These predictions were made by Raleigh W. Stone, associate professor of industrial relations, School of Business, University of Chicago.

The rising tide of public opinion,

directed not only against the CIO, but against the AFL as well, is responsible for halting the momentum of the Lewis organization, Professor Stone said. The present situation repeats the historical phenomenon of 1904 to 1911, when citizens' alliances sprung up all over the country and literally liquidated unionism in all but the big industrial centers.

"The CIO movement is based on the assumption that in the United States we have a separate and distinct working class thinking in terms of class interest, and one that can be united politically, Professor Stone said.

"The fight between the CIO and the AFL is not one between industrial and crafts unionism, but is primarily a clash between the philosophy which assumes a working class and working class movement, and one that assumes that the American workman is a member of the great middle class.

"The best proof that the popular reaction has swung against CIO is found in the action of those governors who either have used troops, or promised to use them, in support of the right to work. And it was that tide of public opinion which led the President to slap Lewis on the wrist with his phrase, 'a plague on both your houses'."

Decline of the CIO does not mean, Professor Stone said, the immediate end of labor troubles and strikes. But he predicted that industrial warfare by the CIO will shortly assume the form of rear-guard action as the retreat gets under way.

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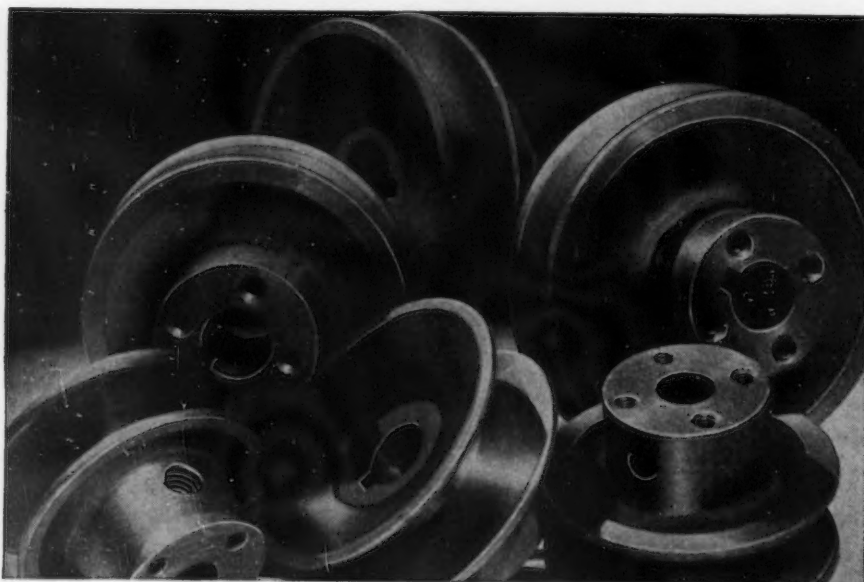
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Carnegie-Illinois Veterans Honored

CARNEGIE-Illinois Steel Corp. honored 130 veteran employees of the Gary works at a special breakfast at Marquette Park pavilion, Gary, July 10.

The men, all of whom have at least 25 years' service, were presented with United States Steel Corp. service medals. Walter E. Hadley, general superintendent of the plant, made the presentation. Especially honored was Frank Strand, 571 Pennsylvania Avenue, Gary, who received a gold medal in recognition of 50 years of continuous employment.

A similar program will be held at the corporation's South works in South Chicago on July 17, when more than 200 employees will receive medals.

Manufacturers Association Suggests Amendments to Federal Labor Laws

PRESIDENT ROOSEVELT'S comments last Friday upon the impossibility of collective bargaining between Federal employees and the Federal Government are to be commended, but they emphasize anew woeful defects in the National Labor Relations act, says a statement issued by the National Association of Manufacturers.

"It is inconceivable that a government established for all the people and interested in the welfare of all employees should be subjected to demands by organized minorities," the statement declares. "It is equally unbelievable that strikes against public agencies, whose uninterrupted operation is necessary, should be permitted. But as the law now stands, no matter what the President's attitude may be, there is no general Federal statute which specifically forbids strikes against or picketing of government agencies.

"This is but one of the many serious omissions from existing law to which the National Association of Manufacturers has been directing attention for years. These were specifically discussed before Congress during the first Senate hearings on what later became the National Labor Relations Act.

"The National Association of Manufacturers believes that rights guaranteed by law should be accompanied by responsibilities required by law. Is it unreasonable to require labor combinations to meet reasonable limitations upon their conduct which are essential to protect the public interest? Such limitations are clearly necessary in the case of the Federal Government and it is to be hoped they will be made a part of the law.

"Is it not just, also, in the consideration of the Federal Government's problem, to ask Congress to correct other plain defects in the present law? Is it not fair to ask that workers be protected from coercion from any source and not just one source in determining whether they wish to join a union and which union if any they wish to join; that strikes be forbidden without the previous presentation of demands and the allowance of reasonable time to consider the demands; that strikes be forbidden in deliberate violation of agreements or voluntary arbitration awards to which the labor organization has been a voluntary party and which it has agreed to accept; that strikes to force employers to violate the law

be forbidden; that all employees affected be granted the opportunity of a secret ballot before a strike may be called; that strikers be restrained from taking possession of

the property of others and continuing to hold it until their demands are met; that jurisdictional disputes instead of interrupting production be referred to some higher authority selected by the disputants within their own national organization; that some restrictions be placed upon sympathetic and general strikes against those with whom the strikers have no quarrel?

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New Steel Ingot Capacity Figures

ANNUAL steel ingot producing capacity of the country has been increased by 289,500 gross tons since Dec. 31, 1936, as a result of the installation of certain new facilities and enlargement of others, according to the American Iron and Steel Institute.

Total ingot capacity of the industry is now rated at 69,534,194

gross tons annually, as against 69,244,694 gross tons at the first of the year. Annual capacity of blast furnaces has likewise been increased, from 49,604,737 gross tons to 49,819,737.

The new capacity figures also correct certain discrepancies between former estimated capacity and actual production of some plants. Capacity is rated principally on actual operating performance records of every furnace in the industry, and the high rate of

operations achieved during the first six months revealed that in some cases the previously reported data on capacity were too low. Technical improvements made from time to time had increased capacity of some equipment even more than had been anticipated.

Effective July 1, the institute will use the revised figures in making its regular monthly and weekly reports of the rate of operations in the industry.

Capacity of the industry for producing steel ingots by various processes, as of the end of last year and as of July 1, 1937, is shown in the following table. Figures shown are in gross tons.

	July 1, 1937	Dec. 31, 1936
Open-hearth	62,160,362	61,965,862
Bessemer	6,325,000	6,325,000
Electric	1,038,252	943,252
Crucible	10,580	10,580
Total capacity..	69,534,194	69,244,694



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111 College Graduates In Bethlehem School

BETHLEHEM Steel Co. has started the largest college training class in the history of the company, as 111 June graduates from many sections of the country reported for work.

The size of this group is regarded by the company as an indication of the revival of college graduate employment in the steel business to a degree not hitherto experienced since the depression. The wide range of opportunity afforded in the steel business is indicated by the courses from which the new men have been selected. These include not only all phases of engineering, but also various phases of metallurgical study, arts courses, business school training and even aeronautics, in which one man majored.

"Until only a few years ago," commented E. G. Grace, president of Bethlehem, "the men entering the steel business gained their technical knowledge only through years of experience in the mills or in the offices. And there is still no substitute for experience. And never can be. Yet today through sound training in the classrooms and laboratories of colleges and universities, men are acquiring a fundamental knowledge of the problems which they will face in their chosen work.

"The requirements of the steel industry have broadened so in recent years as to increase the need for college training in its personnel."

Bethlehem Licensed By Armco

WITH the granting of a license to Bethlehem Steel Co. for its continuous strip and sheet mills and the dismissal of the infringement suit at Buffalo, the American Rolling Mill Co. has now licensed all of the continuous wide strip mills in the steel industry. The development of the continuous wide strip and sheet mill was made by the American Rolling Mill Co. and since then the steel industry has spent upwards of \$300,000,000 in installing these new mills.

Accident Statistics For 1936 Published

ONE of the booklets on the accident experiences of 30 major industries in 1936, published by the National Safety Council, Inc., discusses the causes of accidents in the steel industry. According to figures contained in the booklet, the steel industry ranks sixth in frequency of accidents and twenty-third in severity. Rod and wire mills accounted for the largest number of accidents, while the coke plants had the fewest, although in severity the coke plants had the highest rates. Disobedience of instructions and chance taking were still the principal causes of injury. Another booklet covers the metal products industry, which ranks seventeenth in frequency and tenth in severity.

The booklet contains interesting facts broken down into the experiences of the various plants, departments, types of injuries, etc., and may be secured from the council in Chicago at a cost of 20c. for each industry.

Welding Procedure Handbook Enlarged

A REPRINTED fourth edition of the "Procedure Handbook of Arc Welding Design and Practice," published by the Lincoln Electric Co., Cleveland, includes the weld symbols adopted recently by the American Welding Society, and a new introduction to chapter six, on "Designing for Arc Welded Steel Construction of Machinery."

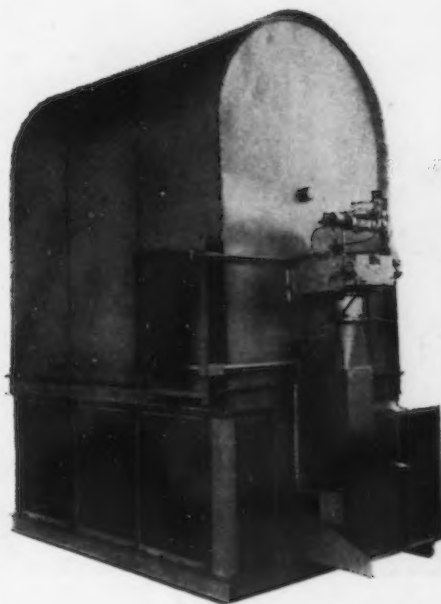
Reproduced in toto as adopted by the welding society, the new weld symbols occupy 16 pages. They are ideographic and their use, as applied to welded design drawings, is fully explained. In addition to the symbols themselves, an example is given of how the symbols

are actually applied in producing a welded design.

The new introduction to the chapter devoted to designing for arc welded steel construction of machinery emphasizes the fundamental principles which the designer should keep in mind in approaching the problem of redesigning for arc welded construction.

With these additions, the handbook now contains 839 pages and more than 1000 illustrations. It

is divided into eight principal parts, as follows: Welding Methods and Equipment; Technique of Welding; Procedure, Speeds and Costs for Welding Mild Steel; Structure and Properties of Weld Metal; Weldability of Metals; Designing of Arc Welded Steel Construction of Machinery; Designing for Arc Welded Structures; and Typical Applications of Arc Welding in Manufacturing, Construction and Maintenance. The price of the handbook is \$1.50.



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Deep-Groove Welding Electrode

FOR flat welding of deep-groove joints in mild steel the Lincoln Electric Co., Cleveland, has brought out a new arc welding electrode designated as the "Fleetweld 9." The electrode provides weld deposits possessing high physical properties, and it is stated

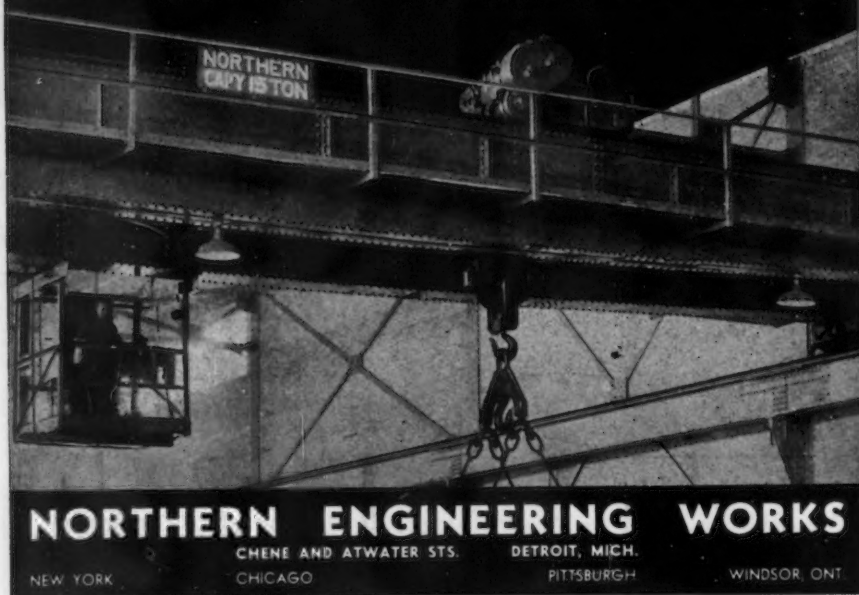
that with proper procedure it overcomes certain conditions frequently encountered in deep-groove welding which tend to cause the formation of surface holes in the metal.

All weld metal specimens of the "Fleetweld 9" will have tensile properties as follows, varying somewhat with the composition of the plate, the heat of welding, capacity of the plate and the size of the electrode used. The metal, as

welded, tensile strength 66,000 to 74,000 lb. per sq. in., yield point 50,000 to 60,000 lb. per sq. in., ductility, elongation in 2 in., 20 to 30 per cent. Average tensile properties of stress relieved "Fleetweld 9" weld metal, taken from 1½-in. plate welded with ¼-in. using 340 amp., a.c. are: tensile strength 68,000 lb. per sq. in.; yield point 53,000 lb. per sq. in.; ductility elongation in 2 in., 33 per cent. On free bend test a specimen of the metal showed 78 per cent elongation in outer fibers.

The electrode is designed to operate with either a.c. or d.c. It is made in 3/16, ¼ and 5/16 in. sizes.

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Iron Content of Ore Fairly Constant

LAKE SUPERIOR ore had an average content of 51.45 per cent during 1936 as compared with 51.44 per cent during 1935 as is shown by the average analysis report of the Lake Superior Iron Ore Association. The average has remained fairly constant for several years, although it increased to 52.16 per cent in 1932 when little ore was moved.

The average iron content of low phosphorus non-bessemer ore increased to 51.35 per cent last year from 51.15 per cent in 1935 and the average content of bessemer ore increased to 54.57 per cent from 54.26 per cent during the previous year. High phosphorus non-bessemer ore decreased in content to 52.30 per cent from 52.41 per cent.

Ore mined in the Mesba district last year had an average iron content of 51.38 per cent as compared with 51.23 per cent the previous year. The most conspicuous change was in ore from Cuyuna Range, the iron content of which dropped to 40.74 per cent from 42.20 per cent the previous year.

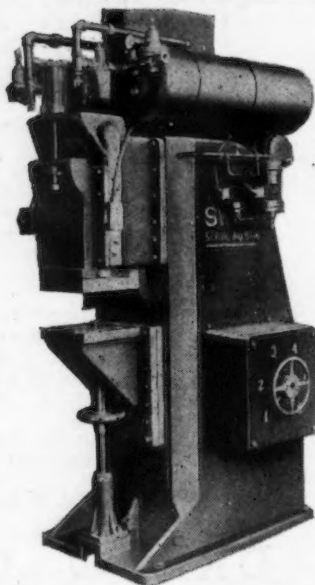
Wheeling Steel Corp. Earns \$5.18 a Share

A NET profit of \$2,693,521, after depreciation, depletion, Federal income and other charges, was announced by the Wheeling Steel Corp. This amounts to \$5.18 a share on 388,091 shares of common stock after allowing for five months' proportion of the \$6 dividend on preferred stock, as compared with a net profit of \$882,199, or \$2.31 a share on 381,466 shares of common for the first six months of 1936. Net earnings for May amounted to \$658,645 as against \$996,069 in April.

SWIFT No. 19 PROJECTION WELDING MACHINE

with 350 KVA transformer

An air operated toggle linkage delivers the two stage welding pressure, a low pressure for heating and a high pressure for upsetting. This operation materially reduces peak current demands.



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Welding machines hand, hydraulic, cam or air operated of the following types: spot, seam, projection, flash, butt, flue and pipe, and gun welding units.

...OBITUARY...

FRANK DISSTON, first vice-president of Henry Disston & Sons, Inc., Philadelphia, died at his home at St. David's, Pa., on July 4, aged 58 years. Mr. Disston, who was a



FRANK DISSTON



WALTER CARY

grandson of the founder of the company, received his formal education at the Penn Charter School and the University of Pennsylvania. He entered the works at Tacony in 1898 and after a short time left to go into financial work. In 1915 he returned to active association with the company and served as a director and officer until the time of his death.

C. E. PIPP, president and general manager since 1911 of the Angle Steel Stool Co., Plainwell,

Mich., died on June 27, aged 73 years.

WALTER CARY, former vice-president, Westinghouse Electric & Mfg. Co. died suddenly of a heart attack on July 2, in his home in New York.

A. C. KRIDER, of Pittsburgh, who before his retirement last year was associated with Charles Dreifus

Co., scrap broker, died in London, England, on June 29.

HARRY W. COFFIN, of Birmingham, former vice-president of the old Alabama company before its sale to the Sloss-Sheffield Steel & Iron Co., died July 9 after a short illness. For a number of years past he had been in the stock and bond business and was a member of the firm of Coffin-McClelland Co.

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Warehouse stocks carried by nationally known distributors

Nitrogen Hardening of Cast Iron

A REVIEW of the nitrogen hardening process and cast irons suitable for treating in this manner was presented by J. E. Hurst, of England, before the recent annual convention of the American Foundrymen's Association at Milwaukee, Wis.

Mr. Hurst introduced his discussion by stating that alloy cast irons suitable for nitrogen hardening, which have come to be known as Nitricastiron, are essentially alloy cast irons containing aluminum and chromium. In this respect they are analogous to the aluminum-

chromium series of alloy steels introduced for this purpose and known as Nitralloy steels. Typical analyses and mechanical tests for centrifugally cast and sand cast nitrogen hardening cast iron have been prepared by Mr. Hurst and are shown in the accompanying table.

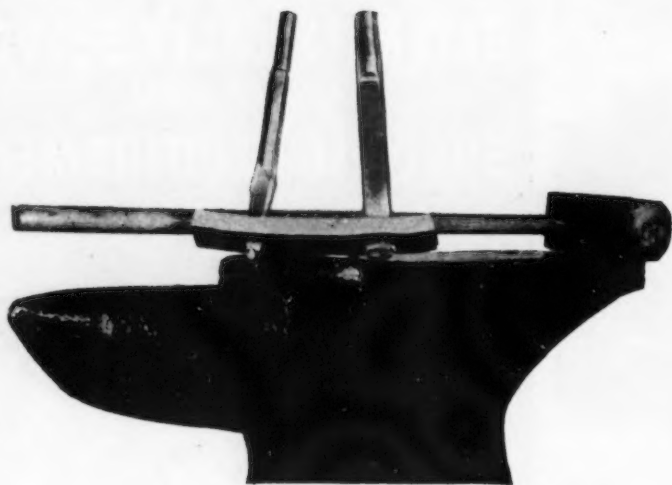
The hardening and stabilizing treatment for the iron in the table consisted of oil quenching from a temperature of 1598 deg. F. followed by reheating to 1112 deg. F. for a period of 1 hr., cooling slowly from this temperature in still air. The nitrogen hardening treatment was carried out for a period of 90 hr. at a temperature of 950 deg. F. \pm 9 deg. F. in ammonia gas, the degree of dissociation being maintained at a value of 30 per cent. The measured depth of penetration of the hardening effect was 0.016 to 0.018 in. and 0.015 in. in the centrifugal and sand cast specimens respectively.

Very frequently articles for case hardening require some surfaces to be left soft for subsequent machining operations, the cutting of threads, keyways, etc. The protection of such surfaces from the hardening effect is commonly done by tinning, according to Mr. Hurst. Pure tin or tin solder is generally used for this purpose. Although such solders melt at a lower temperature than the nitriding temperature, a sufficient amount will adhere by reason of surface tension and will supply ample protection.

In the application of tin the parts are thoroughly cleaned and a flux of hydrochloric acid (killed) applied. The articles are then dipped into a bath of molten solder or tin and kept there sufficient time for the tin to adhere. The excess of tin can be shaken or brushed off with a wire brush on removal from the bath.

Nickel plating to a depth of 0.0005 in. has been found effective in preventing nitriding.

Experiments have been made with protective paints. Positive results have been obtained with paints made up of stannous or stannic oxides and, said Mr. Hurst,



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these compounds decompose in the nitriding furnace to form tin.

Another protective paint consists of powdered aluminum and sodium silicate. This is applied with a brush to the surfaces to be protected and then allowed to dry. A hard coating is formed which can be removed after nitriding by boiling the articles followed by scratch brushing.

The most recent type of protective paint consists essentially of a mixture of finely powdered lead and tin suspended in an oily vehicle of animal oils. This can be applied to the articles by means of a brush or spray pistol. The fine coating of powdered lead and tin thus obtained on the surface melts at the nitriding temperature and thus exercises the same function as the solder applied in the manner previously described.

In reviewing the chemistry of nitrogen hardening cast iron, Mr. Hurst mentioned that the essential alloying elements are aluminum and chromium, and so far the best results both as regards maximum surface hardness and total depth of penetration are obtained when these two elements are present conjointly. Nitrogen hardening is obtained in alloy cast irons in which either of these elements are present singly.

The effect of silicon, manganese and phosphorus on the hardening properties of aluminum chromium alloys as used for nitrogen hardening in the centrifugally cast condition also has been studied.

It has been shown that the variation in silicon content has no effect upon the degree of surface hardness attained, but it does appear to have an effect upon the total depth of penetration; the higher the silicon the lower the depth of penetration.

In the case of phosphorus the results show that with phosphorus in excess of 0.20 per cent a reduction in surface hardness is obtained, but the total depth of penetration is not effected. Within the range examined manganese appears to be without effect either upon the degree of hardness or the total depth of penetration.

The addition of other elements, molybdenum, titanium, vanadium, tungsten, copper and nickel have

been referred to among others in the patent literature relating to both nitrogen hardening steels and cast irons. While a considerable amount of work still remains to be done in studying systematically the effect of these elements, it is already known that some of them are of importance and value through the influence they exert on improving the freedom from fragility of the case and the mechanical properties of the material after subjec-

tion to the nitrogen hardening treatment.

The element molybdenum has proved of considerable value in this respect, said Mr. Hurst, particularly in its effect in preventing a type of temper brittleness which may appear in these alloy cast irons. This effect, particularly in the presence of nickel after the long period at the low temperature of 932 deg. F. during the nitrogen hardening treatment was referred

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to by Mr. Hurst in his paper before the A.F.A. last year. It is by no means an uncommon practice to use molybdenum additions up to 0.6 per cent in commercial Nitri-castiron.

The desire to avoid the difficulties inherent in the handling of aluminum-containing cast irons in the foundry is probably responsible for attempts to eliminate the aluminum as in the case of the following patented composition: Total carbon 2.0 to 4.0 per cent; silicon 1.0 to 4.0 per cent; manganese 1.0 per cent max.; chromium 1.5 to 3.5 per cent. If other elements are included tungsten may be present up to 2.0 per cent, and titanium, vanadium, and molybdenum not over one per cent. After nitrogen hardening cast iron of the above general composition the Brinell hardness has been raised from 400 to approximately 800. This, of course, is less than that obtained with the aluminum-chromium alloys.

The nitrogen hardening process

COMPARISON OF PROPERTIES OF CENTRIFUGALLY CAST AND SAND CAST NITROGEN HARDENING CAST IRON

Analysis	Centrifugal Per Cent	Sand Cast Per Cent
Total carbon	2.65	2.62
Graphite	1.10	1.63
Combined carbon	1.55	0.99
Silicon	2.58	2.44
Manganese	0.61	0.60
Sulphur	0.07	0.075
Phosphorus	0.096	0.098
Chromium	1.69	1.58
Aluminum	1.43	1.37
Modulus of Elasticity	Lb. per Sq. In.	Lb. per Sq. In.
As cast	22,500,000	19,500,000
Annealed	23,700,000	19,700,000
Hardened and stabilized	23,000,000	19,200,000
Nitrogen hardened	23,500,000	20,100,000
Tensile Strength	Lb. per Sq. In.	Lb. per Sq. In.
As cast	55,000	44,350
Annealed	66,750	51,300
Hardened and stabilized	66,100	64,100
Nitrogen hardened	66,750	53,500
Permanent Set	Per Cent	Per Cent
As cast	2.5	6.1
Nitrogen hardened	4.75	9.7
Firth Diamond Hardness	No.	No.
As cast	418	340
Annealed	302	269
Hardened and stabilized	302	300
Nitrogen hardened	982	904

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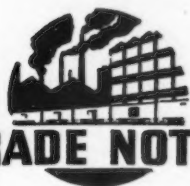
Rotabins save 40-60% of floor space.

They increase present floor space capacity and can be used with present shelving.

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WELLSTON OHIO

has been extended also to the surface hardening of austenitic cast irons. As is well known certain austenitic cast irons possess a valuable property in that they have a high coefficient of expansion. By treatment with the nitrogen hardening process a surface hardness of up to 500 Brinell and sometimes higher can be obtained. This is of value in improving the wearing and running properties of wearing surfaces on articles manufactured in alloy cast irons of this type.



General Refractories Co., Philadelphia, has appointed Tennessee Mill & Mine Supply Co., Knoxville, Tenn., as distributor in the Knoxville area. Tennessee Mill & Mine Supply Co. will carry a complete stock of refractories.

Atlantic Brass & Copper Co., New York, has moved to larger quarters at 593 Broadway.

Buffalo Scale Co., Buffalo, has appointed E. J. Kelly, 2010 Locust Street, St. Louis, as distributor for the complete line of Buffalo scales. His territory includes Missouri and southern Illinois.

Pipe & Tube Bending Corp. of America, 24 Grafton Avenue, Newark, N. J., has announced that in the future its business will be carried on under the name of the parent company, Tube Reducing Corp. Main office of Tube Reducing Corp. will remain at Stamford, Conn.

Terry Steam Turbine Co., Hartford, Conn., has appointed the following district representatives who will handle the sales of Terry turbines, reduction gears, etc.: W. Cooke, New Orleans; Cowles & Co., Dallas, Tex.; M. N. Dannenbaum Co., Houston, Tex.; and W. V. Jackson, Tulsa, Okla.

New York Belting & Packing Co., Passaic, N. J., has appointed the Whittle Hose & Rubber Co., 549 West Randolph Street, Chicago, as distributor of its complete line of mechanical rubber goods in the Chicago district.

United States Steel Corp. has declared a dividend of \$2 per share against the accumulated arrearages on its preferred stock. There remains unpaid on account of arrearages in dividends on preferred stock, \$1.25 per share, totaling \$4,503,514.

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MONTHLY SHIPMENTS OF FINISHED STEEL PRODUCTS BY UNITED STATES STEEL CORP.—TONS

Month	1933		1934		1935		1936		1937	
	Ship- ments	Per Cent of Ca- pacity	Ship- ments	Per Cent of Ca- pacity	Ship- ments	Per Cent of Ca- pacity	Ship- ments	Per Cent of Ca- pacity	Ship- ments	Per Cent of Ca- pacity
January	285,137	17.7	331,777	19.8	534,055	31.9	721,414	44.8	1,149,918	*76.7
February	275,929	18.5	385,500	25.9	583,137	39.2	676,315	45.3	1,133,724	*81.9
March	256,793	15.3	588,209	35.2	668,056	41.5	783,552	50.5	1,414,399	*90.9
April	335,321	21.6	643,009	41.5	591,728	36.7	979,907	63.2	1,343,644	86.4
May	455,302	27.1	745,063	44.5	598,915	35.8	984,097	63.4	1,304,039	83.8
June	603,937	37.4	985,337	61.2	578,108	36.7	886,065	57.1	1,268,550	81.5
July	701,322	45.1	369,938	23.9	547,794	34.0	950,851	61.3	.....	.....
August	668,155	39.8	378,023	22.6	624,497	37.3	923,703	59.6	.....	.....
September	575,161	35.6	370,306	23.9	614,933	39.7	961,803	62.0	.....	.....
October	572,897	35.5	343,962	20.6	686,741	41.1	1,007,417	62.6	.....	.....
November	430,358	26.7	366,119	22.7	681,820	42.3	882,643	59.2	.....	.....
December	600,639	38.7	418,630	27.0	661,515	42.7	1,067,365	68.8	.....	.....
Plus or minus yearly adjustment	.....(+44,283)	...	.....(-19,907)	...	.....(-23,750)	...	.....(-40,859)	...	.....	.....
Total for year	5,805,235	30.1	5,905,966	30.6	7,347,549	38.1	10,784,273	58.2

* Revised to capacity at Jan. 1, 1937. † Adjusted.



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Heavy Springs
Rolled Rings
Gear Blanks

**GREATER MILEAGE
CRANE WHEELS**

The principal advantages of Standard rolled steel crane wheels are greater strength and toughness and better adhesion to the rail with a minimum of wear on the wheel and rail.

The open hearth steel used in these wheels is produced in our own furnaces subject to close metallurgical control.

STANDARD STEEL WORKS CO.
Subsidiary of the Baldwin Locomotive Works
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STANDARD

U. S. Steel Corp. Shipments in June

JUNE shipments of finished steel products by subsidiary companies of the U. S. Steel Corp. amounted to 1,268,550 tons, a decline of 35,489 tons from the May figure of 1,304,039 tons, but an increase of 382,485 tons over the June, 1936, figure of 886,065 tons. In fact, the current tonnage is the highest for any June since 1929, when 1,385,506 tons were shipped.

For the first six months of 1937, shipments totaled 7,614,274 tons, an increase of 2,582,924 tons above the corresponding 1936 period, a gain of 51 per cent.

Italy Forming Big Steel Combine

WITH the object of rationalizing the Italian iron and steel industry, a new holding company is being formed entitled the Societa Finanziaria Siderurgica. To this the Industrial Reconstruction Institute is transferring its holdings of shares in the four following concerns: Ilva, Terni, Dalmine, and Acciaierie di Cornigliano. The institute holds the majority of the shares of these companies. The new holding company will have a share capital of 900,000,000 lire (about \$47,500,000).

RAILROAD equipment orders in the first six months of 1937, amounting to 228 locomotives, 45,090 freight cars and 456 passenger-train cars, exceeded the entire 12-months totals for each of the years from 1931 to 1935 inclusive, according to *Railway Age*. Freight car purchases for the first six months of this year were 60 per cent greater than in a corresponding period of 1936, and passenger cars ordered for this year to date show an increase of more than 300 per cent over a similar period last year.

With Speed Case Well Established Monarch Steel Co. Introduces Steel Treat

SINCE the introduction of Speed Case more than two years ago, Monarch Steel Co. has constantly improved this steel, working always toward the end of obtaining higher physical properties and, at the same time, not sacrificing anything in free machining.

The experimenting necessary to bring Speed Case up to the point where it is today required a great deal of experimental effort, and the facts disclosed in these experiments led the company to believe that a steel of the same type could be produced in the higher carbon ranges. The following data indicate the success this company has had in producing a steel with fine physical properties and, at the same time, machineability ratings not usually associated with the high-carbon ranges. The experiences of many consumers has been that Speed Case is one open-hearth steel with good physical properties, including both strength and ductility, which will machine faster than SAE 1112 bessemer screw stock. This is most unusual for an open-hearth, case-hardening steel, which will machine at over 200 surface ft. per min., yet is ductile enough to take a 1 in. round cold-drawn bar and bend it flat on itself, or tie it in a knot and pull it tight, without the slightest sign of fracture. Such a bar actually treated in this manner is shown in the accompanying photograph. For this reason Speed Case is used on a multitude of jobs where free machining is essential, yet where the ability to stand severe cold forming, crimping, rolling or bending operations is likewise most essential.

The first high-carbon steel brought out by Monarch was Speed Treat X-1535, 0.30 to 0.40 carbon, which, like Speed Case, is an open-hearth steel using the same exclusive Speed Case process. The steel X-1535 develops considerably more strength due to the high carbon, yet it machines practically as fast as Speed Case and is almost as ductile. This steel has a tensile strength of approximately 95,000 lb. per sq. in., yet it will machine at over 150 surface ft. per min., or carry a machineability rating of 100 percent; it gives very good tool life and it is ductile enough to bend flat on itself in the cold drawn condition without fracturing.

The third and most recent steel



OHIO LIFTING MAGNETS



Above is a 45" Ohio Magnet at work in the Reheating Furnace Department of a new 100" Semi-Continuous Plate Mill in the Pittsburgh district.

It handles returned slabs 22" to 54" wide by 48" to 180" long and weighing from 1000 to 25000 pounds.

Also the Scale Cleaner or Mechanical Slab shown and weighing from 4000 to 5000 pounds.

We make Ohio Magnets for many purposes.

THE OHIO ELECTRIC MFG. CO.

5908 Maurice Ave.,

Cleveland, Ohio

brought out by Monarch, Speed Treat X-1545, which is a 0.40 to 0.50 carbon open-hearth steel having a tensile strength of 110,000 lb. per sq. in., is like the other two steels, particularly efficient as far as free machining is concerned.

The steel X-1545 approaches SAE 1112 bessemer in free machining, as it carries a rating of 90 per cent. If this is compared to SAE 1045, which carries a rating of 57 per cent, and it is kept in mind that Speed Treat X-1545 is from

5000 to 10,000 lb. per sq. in. stronger in tensile, it is evident that great savings are possible in machining, which will in general offset many times the slight increase in the cost of X-1545.

The foregoing indicates, therefore, that Speed Case will machine faster than SAE 1112 bessemer, X-1535 at the same speed, and X-1545 only slightly lower. This means that due to the varied and unusual physical properties, these three steels can be substituted for

practically all of the SAE non-alloy steels under 0.50 carbon. It becomes merely a question of choosing the steel of the proper tensile strength, as it is no longer necessary to slow up production merely because the steel required happens to be in the high-carbon range.

Speed Case, of course, has been recognized as a leader in the case-hardening field, on account of its ability to get a tough and ductile core of approximately 28 Rockwell C, in combination with a hard uniform surface of from 63 to 66 Rockwell C. The two Speed Treat steels, X-1535 and X-1545, lend themselves readily to heat treatment, so excellent physical properties can be developed in the heat treated state, yet at the same time the user has the advantage of machineability far in excess of what was formerly obtained from steels of the same carbon content.

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In 1905, thirty-two years ago, we installed 25 Kinnear Steel Rolling Shutters on the first floor of our St. Louis Warehouse Sales Branch. These doors have seen continuous service all these years and have been very satisfactory.

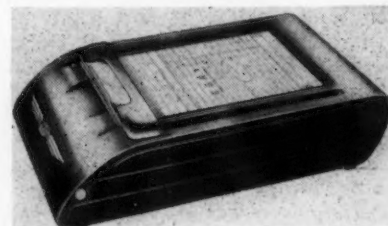
Recently our attention has been called to these doors and we have

to these doors and we have

Think of it! 32 years of continuous efficient door service. And then, through Kinnear's reliable, nation-wide facilities the doors that may have been damaged are reconditioned with genuine Kinnear replacement parts . . . made ready for many more years of use. That's service which speaks for itself. Let us show how Kinnear Upward Acting Doors can better serve your needs.

Portable Counter Register Has Shop Uses

THE portable counter register illustrated, a new product of the Egry Register Co., Dayton, Ohio, is offered for multiple-copy writing of shop as well as business records. Shop uses include the writing of production and repair



Portable counter register for making multiple-copy shop records.

orders, parts requisitions, piece-work tickets and time slips.

This register is designated as the "400 Line" Handipak. It is made of aluminum alloys, is compact, and may be carried like a sales book. It employs the company's continuous Fold-Pak forms, up to five copies in the set, which forms are kept in registration through alignment in the folds at the perforation. The multiple-copy records are clear, and space is provided inside the register for the filing of audit copies. The device is made in seven sizes, from 4 5/16 x 5 in. to 8 1/2 x 8 1/2 in. It is finished in blue lacquer and chrome plate.

In addition to Steel Rolling Doors, Kinnear manufactures Steel Rolling Fire Doors and Shutters, Wood or Steel Roll-UP Doors, Wood or Steel BiFolding Doors and Metal Rolling Grilles . . . for old or new buildings, and for motor or manual operation.



KINNEAR
ROLLING DOORS

The **KINNEAR MANUFACTURING CO.**
1760-80 Fields Ave. Columbus, Ohio

British Reduction of Steel Duties Expected to Increase Imports

LONDON, July 7.—The total rate of British import duty on many classes of iron and steel goods has been reduced as from today to 12½ per cent ad valorem until March 31 next.

In the case of consignments of these goods, other than forgings and castings, imported with a quota certificate and certificate of origin, which are exempted from additional duty, the total duty is 2½ per cent for the same period. The previous level was 10 per cent.

In both cases the previous rates have been in force since the signing of the five-year pact between the British Iron and Steel Federation and the International Steel Cartel on July 31, 1935.

The present drastic reduction does not affect the agreement with the cartel. It preserves the essential difference between cartel and non-cartel countries, which is the essence of the plan, while opening up any possible additional sources of supply—particularly the United States.

The products which will bear the reduced duty are as follows: Ingots; blooms, billets and slabs; girders, beams, joists and pillars; angles, shapes and sections; bars and rods; plates and sheets; hoop and strip (other than hot rolled strip over 10 in. wide in coils weighing over 300 lb.); rails; forgings (including drop forgings and rolls from rolling mills) in the rough or machined; and castings (including rolls for rolling mills), stampings and pressings, in the rough or machined, weighing 7 lb. or over, other than gutters, domestic tanks and cisterns.

In its report the Import Duties Advisory Committee states it is satisfied that the regulation of the flow of imports under the existing arrangements has facilitated equitable distribution to consumers. It has enabled the United Kingdom, at a time when world export prices were rising to high levels, to secure the main bulk of its requirements on favorable terms, and so to maintain domestic prices at a reasonable level.

The world shortage of iron and steel still persists, and, despite the substantial expansion of British production, difficulties are still being experienced in meeting the domestic demand. The committee points out that for much the greater part of Britain's imported supplies of the main products the country has for many years been

dependent on the adjacent Continental countries. The committee is satisfied that this position must remain and that it would be impossible to replace these imports from other countries at reasonable prices.

Under present conditions of demand, however, it has proved im-

practicable for the time being to meet Britain's full requirements from the normal sources of supply. The committee's recommendation, therefore, is intended both to stimulate the flow of imports through normal channels and to facilitate additional imports from other sources wherever these are obtainable, without sacrificing the advantages of the present arrangements and, in particular, without endangering either the main supplies from abroad or the prices of such supplies.

PERKINS MAN COOLER



Trade Mark
Reg. U. S. Pat. Off.

PERKINS MAN COOLERS, recognized as the most efficient appliance for bringing comfort to workers in hot places, are proving a vital factor in production. They are keeping men comfortably at work in the hottest places, reducing labor turnover, speeding production. Made in **OSCILLATING** and **STATIONARY** types (both portable).

B. F. PERKINS & SON, INC. HOLYOKE, MASS.

Loyalty — From the Workers Side

IN this day of sit-down strikes, lockouts and widespread industrial strife, an expression on the subject of loyalty from the workers' side seems to be appropriate if not refreshing.

In most cases the subject of loyalty is presented by the employer who endeavors to tell the worker why he should be loyal and to explain the good he will get out of so being. From the employee side, loyalty is usually handled in the manner of a rebuttal, with the worker endeavoring to beat down the facts presented by the boss. Such rebuttals are made by persons or groups concerned with furthering their own interests at the moment. They seem to have little regard for the future. In this article an attempt will be made to discuss loyalty from the workers' side, not on the basis of an argument, but as an analysis of the problems confronting the individual. Group loyalty cannot be accomplished until you have co-operation from the individual. Therefore, it appears that a discussion of the workers' individual problems is a logical starting point.

The discussion will center around the problems of the white collar worker, because of the author's experience in that field.

By RICHARD WHITMAN

• • •

However, the principles set forth will apply to all classes from the bookkeeper to the man on the assembly line.

To the individual, loyalty means performing the work you are hired to do to the best of your ability. In addition it means furthering the interests of your company at every opportunity. We all know there are just as many reputations built up, or for that matter dragged down, after five o'clock as there are before five. Loyalty means giving that extra something, that intangible, unmeasurable service which every company needs and must have in order to prosper. With the upturn in business changes in personnel are becoming more numerous. Thinking still as an individual, the time will come when many aggressive employees will be faced with the question, "Shall I get another job or shall I stick?"

Right then and there will come a test of your loyalty, not only to your present employer but to yourself. The decision you make should be a selfish one. It should

be for your own best interests. For this reason it is necessary to consider the problem from all angles. So many times one outstanding feature blinds us to some other aspects of the problem which when brought out in the open and coolly analyzed may cause us to decide another way.

In considering a change in position the most prominent inducement is usually salary. This is natural, for money is the foundation on which rests other desirable things in life—a home, a family, food, clothing and security.

From the standpoint of money alone it is reasonable to assume that there are many employees today who could command higher salaries from other than their present employers, and get it.

There will always be cases where an opportunity is presented to a man which is so outstanding that he would be a fool to turn it down.

Aside from such exceptional cases the average man should consider salary on the basis of how much of a spread there is between the present and the proposed. If the difference is 15 per cent to 30 per cent, the question is whether the change is worth the difference. Also, will not your present employer approach that figure within a reasonable time? If the increase is up to 100 per cent, serious consideration is warranted, but your ultimate decision should include a careful weighing of all other factors surrounding the change.

Should the difference in salary be anywhere from 100 per cent to 300 per cent, and I have known cases where such offers have been made, then look out. Either you have hidden genius which your present employer has failed to recognize or the prospective employer is badly in need of help from you and probably others, maybe his banker. Of course, there will always be cases where a man's talents (such as an engineer or chemist) will be a great deal more valuable to someone else. It may be his present employer couldn't afford to pay for such service, or if he could, doesn't need it for the job he has to do.

For the run-of-mine type jobs you don't usually find such attractive offers unless the high salary is used to cast a shadow on some less desirable features. The job

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market is like any other, you don't get something for nothing.

Second to be considered is the company offering the job. You will, of course, want to satisfy yourself that it is reliable, safe, progressive and well managed. Be honest; ask yourself why they want you. Determine what their policy is with regard to employees. Do they have frequent changes in personnel and are you just one of a new batch to take the place of others who have gone before?

Finally, what does the future hold as compared with your present connection? Would you be at the bottom of the pile in the new place as compared with being at least in the middle or near the top in your present organization?

The hazard of unemployment from the individual's point of view is more serious than from the standpoint of the masses. The entire army of unemployed can reasonably expect some measure of relief which will enable them to keep body and soul together.

You as an individual want more than that. Therefore, you should look ahead and consider what a few months' unemployment will do to the profit and loss statement of "You, Incorporated". If you have been making \$100.00 a month, and are unemployed for three months, the next job should pay at least \$132.00 per month, so that you will break even at the end of the year.

Elementary, "Dear Watson" and yet try to explain this to a worker who has been on strike and has just won an increase of \$6.00 a week. He thinks he is sitting on top of the world.

It is said, in connection with the recent strikes in the automobile industry, the average employee will have to work two years at the new scale to make up for the salary lost during the many weeks of strike.

Comparison

The third consideration is how your present position stands in comparison with the new one. There are any number of people who for one reason or another get themselves started up a blind alley. If you are in such a position, have the courage to face the issue and get out as quickly as possible. If you know you can do better and your present employer cannot offer anything attractive, in justice to him as well as yourself, get another job. You will both be happier.

If, on the other hand, you are in a position where there is a reasonable chance for self improvement, then you should consider where the advancement will be most rapid. If possible, try to analyze the other

fellows in similar positions. Are they making more money, enjoying more comforts; are they happier; in short, would you want to change places with them?

So far, the tone of this article has been one of caution. An effort has been made to set forth the problems confronting the average employee when he is considering a new job. In so many cases the employee throws caution to the wind, says "to hell with loyalty!", and takes a job at \$5.00 a week more. Often he would be better off sticking to his old job.

On the other hand, loyalty to your employer should be tempered with a decent, honest desire on your part for self improvement. You should go after more money, a better job, more responsibility, but do it on a friendly basis, in a

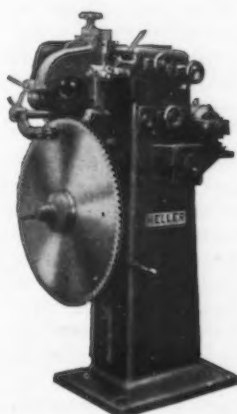
manner which both parties can understand and appreciate.

If you are unsuccessful, take it gracefully, be patient, investigate all offers from others, but above all be honest with yourself and your boss.

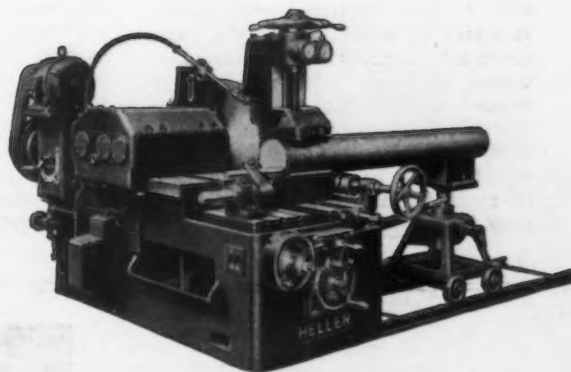
Worry

Recently, a friend told me of the mental anguish he had suffered, of the tremendous effort he had put forth to get a raise, which finally amounted to \$500.00 a year. When it was all over, he said to himself, "What a damn fool I've been. At the end of two years I'll be \$1,000 richer, less taxes, and I've spent the last five months worrying about it. In another five months the raise would have come along anyway."

This article is not written from the bosses' point of view and no



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one is foolish enough to believe they can sit back and have a raise come along without effort. Unless there is a depression and you are doing everything you can to hold your job (there was a depression, remember?), you have to get right in there and fight for what you want. However, be sensible about the matter. If you really deserve more money, if your position warrants it, then it is reasonable to assume you will get it sometime. Unless you work for an outright "so and so," there is no reason to think otherwise.

Taken over a period of years the question is whether continued employment, with slow but steady advancement, is more attractive than frequent changes at what might seem higher monetary returns.

The hazard of unemployment which is apt to occur between jumps, together with the strain on your nervous system in trying to adjust one's self to changing conditions, leads one to believe that aside from the "breaks" the steady man will come out about even with the jumper in dollars and cents, and probably miles ahead in peace of mind and happiness. Thus you have one of the reasons why an employee who is capable of analyzing his own position is apt to be loyal to his company. It is good business and common sense. Loyalty to him means a reasonable standard of living, happiness, contentment, security, to his employer better business and more dividends. Such loyalty is the mortar in the foundation of American business. If you as an employee will be loyal to yourself, you will in most instances find loyalty to your boss best for all concerned.

A Small Steel Fabricator Speaks On Quantity Differentials

To the Editor:

IS it not time that some of the immediate problems of the small fabricator in the iron and steel industry be brought to attention for intimate and frank discussion—or isn't there a voice among us loud enough to be heard?

In addition to the added business difficulties resulting from the growing labor unrest, taxes and unfair competition from the mills and warehouses, we are faced now with the burden of paying unreasonable amounts, known as "quantity differentials," for purchasing steel in small lots. No doubt this system of quantity differentials is being put in force on account of the pressure exerted by the warehouse men against the mills—but why should the small user of steel be ground between these two millstones?

The small fabricator has been compelled to buy from the mills in order to save himself and meet competition. And one of the primary reasons for this has been the unfair competition created by the warehouse men when they began to fabricate steel for the same customers previously supplied by the fabricators. Not only this, but in addition to fabricating material, the warehouse men have been designing structures and preparing plans without charge for these customers, taken from the small fabricator, in order that they might get the tonnage. Where is

the equity or fairness in this; and what else could the small fabricators do in such a situation but go to the mills for their source of supply?

Let the mills refrain from taking small jobs; let the warehouse men stick to their direct line of business and let them be satisfied with a moderate percentage over mill costs instead of the high prices they are demanding. If these corrections are brought about, it is apparent that the small fabricators will give the warehouses more of their business.

None of the small fabricators of the character as indicated in this communication individually is big enough to demand this remedy for the situation as now developed—and he is bearing the burden as best he can. Collectively, it would seem that the small fabricating plants represent sufficient strength and potential tonnage to seek and demand the recognition and consideration to which they are entitled from the mills and warehouses.

We all know that the small business man forms the backbone of the welfare of the nation. Why then should those in this class in the fabricating of steel be penalized so severely in every respect when they are trying to do a worthwhile job?

*Irvington Steel & Iron Works
(Signed) Alex. Katchen, Secretary
Irvington, N. J.*

The Modern Covered Wagon

A PORTABLE X-ray unit has been mounted in this covered trailer chassis by St. John X-Ray Service, Inc., Long Island City, N. Y., so as to facilitate the handling of the many field inspections of welded structures which this company is called upon to make. The machine is powerful enough to penetrate 3 in. of steel in a 1-min. exposure.



Sheet & Tube Opens Strike-Bound Mill at East Chicago, Ind.

CHICAGO, July 13.—The Indiana Harbor plant of the Youngstown Sheet & Tube Co., which has been closed by a strike since May 26, opened peaceably this morning with no more ado than if operations were being resumed following a holiday shutdown. About 1700 men are in the mill today, which number, company officials state, is more than enough to carry on the limited operations possible at present. It is estimated that by Friday of this week, operations will be at capacity and the full force of 7000 employees will be back to work.

Employees were asked to return to the mill via regular runs of suburban trains, whose tracks run alongside the plant, so as to be under the protection of railroad police should any violence be attempted. Pickets had been withdrawn yesterday afternoon, however, and the gates to the plant were clear and accessible.

In the town of East Chicago last night a curious and paradoxical situation existed in that both the Association of Steel Employees, the Independent Union of Youngstown employees, and the members of the SWOC were celebrating and claiming victories, whereas in reality work was resumed under the very same conditions as when the strike was called.

A controversy has developed between the company and Governor Townsend, of Indiana, relative to the Governor's statement that both the company and the union had signed agreements. The statements of the Youngstown Sheet & Tube Co. covering this controversy are published in a subjoined article.

The following statement was released by Marshall A. Pipin, attorney for the Association of Steel Employees, after a long distance telephone conversation with Mr. Argetsinger:

"I am informed by J. C. Argetsinger, vice-president and general counsel of the Youngstown Sheet & Tube Co., that the company has signed no truce, agreement, memorandum of understanding or other undertaking with the SWOC, directly or indirectly, or with Governor Townsend. I was further informed by Argetsinger that all the company did was this: At the request of the Governor, the company on July 3 submitted in strict-

est confidence and for only the Governor's information a statement of the company's labor policy as it existed before the strike. A copy of this was given me by Mr. Hutson, Indiana Labor Commissioner, at our meeting in Indianapolis last Tuesday. I did not examine the statement until I returned to Chicago when I noticed that it stated that it was confidential and only for the information of the recipient (Governor Townsend) and that in both the opening and closing paragraphs it was expressly stated that the statement was not to be construed as an agreement of any kind with any one. In the statement it was further said that the company did not undertake or hold out that it would continue the labor conditions therein set forth.

"In other words if there has been any agreement, the agreement can only be on the part of the SWOC without any agreement on the part of the company. If this is what the SWOC calls an agreement then it could have had such an 'agreement' with itself without a strike. Instead of a truce, the SWOC has surrendered and has resorted to subterfuge and misrepresentation to save its face. It is natural that it should do this for the SWOC is thoroughly defeated. The Association of Steel Employees is victor in its efforts to get the men back to work. I am further informed that in reopening the plants, the company will do so under the terms negotiated for the employees by the Association of Steel Employees as collective bargaining agent, among which terms

are the retention of this year's vacation with the option to take the vacation time or continue to work and receive the vacation pay, waive a physical examination for men returning to work and that the company will not only keep up its payments under the group insurance during the strike period but also will advance the employees' share of the premiums for the months of June and July and permit the repayment of these advances in easy installments over a reasonable period of time.

Meanwhile, at Inland Steel Co. plant nearby, signs are posted throughout the plant informing employees that reports being circulated in East Chicago to the effect that the company has signed an agreement with the SWOC are untrue and that no such agreement exists.

In South Chicago Monday the plant of the Valley Mould & Iron Co., closed since May 30 by a strike, was reopened without trouble, no agreement or contract with the union having been signed. A statement of labor policy has been mailed to all employees, in which the provision is included that in case of further labor disputes where no settlement can be reached between the company and men, the senior judge of the United States District Court of the Northern District of Illinois, will be asked to help arrange a settlement.

Labor difficulties throughout this district appear to have reached a minimum, and the power of the CIO in the metalworking industries at least seems definitely broken.

Sheet and Tube Accuses Townsend Of Misrepresentation in Labor Dispute

CHICAGO, July 13.—Emphatic denial that the Youngstown Sheet & Tube Co. made any settlement with the SWOC that led to the reopening of its Indiana Harbor works, as was indicated in a statement given out by Governor Townsend of Indiana and published in the daily press, is made by J. C. Argetsinger, vice-president and

general counsel of the Youngstown Sheet & Tube Co., who issued the following statement Monday:

"The so-called nine-point statement which the Governor of Indiana, according to the newspapers, claims was used as the basis of a so-called settlement between the Youngstown Sheet & Tube Co. and the SWOC was never

even seen by the Youngstown Sheet & Tube Co., was invented by the Governor by lifting, rephrasing and abbreviating portions of the unsigned statement of labor policy based upon the company's letter of May 28 mailed to all employees, previously sent the Governor by the company, and was not the basis of any settlement," said Mr. Argetsinger.

"I repeat emphatically," Mr. Argetsinger said, "what I said yesterday on this subject, that there has been no settlement between the company and the SWOC, that there was no settlement pact or understanding, and that the reports of this situation as attributed to the governor, are pure fiction, apparently deliberately intended to distort the facts to the public.

"Some time ago at the Governor's request we sent him a statement summarizing what our labor policy is and has been for the last 20 years, based upon the company's letter of May 28 to all its employees. This statement was not signed by the company. The Governor apparently picked up certain sentences out of this statement, and then released his own private version to the press as the basis for a so-called settlement which never took place. This in spite of the fact that we told the Governor that our statement of labor policy was not to be used or construed by anyone as anything which might constitute an agreement with anybody.

"We cannot believe that Governor Townsend made the statement attributed to him by the press that a 'settlement plan signed by both sides was proposed by Youngstown Sheet & Tube officials,' or any other statements of this nature, because he knows they are not true. We do not believe Governor Townsend would resort to his diplomatic ton-sillitis fiction in a matter as serious and important as this one.

"The memorandum which we sent the Governor was not a settlement plan, it was not signed, it was furnished only when asked for by the Governor himself, and it was not to be used by him or anybody else in any manner as any kind of an agreement.

"The Youngstown Sheet & Tube Co. has not asked Governor Townsend for any troops to assist at the opening of its Indiana Harbor plant. It has not asked the Governor for anything. Throughout this entire controversy it has merely restated its original premise—that it would sign no contract or make no agreement, written or otherwise, with the SWOC and that when protection was forthcoming which would make it possible for its employees

to go back to work with safety, the gates of the plants would be reopened."

The First Statement

The previous statement of Mr. Argetsinger referred to above, which was issued Sunday, was as follows:

"I am advised it is stated by some source that pickets at Indiana Harbor and South Chicago are being withdrawn. We have no knowledge or explanation thereof. The Youngstown Sheet & Tube Co. has not made any agreement, contract or method of settlement with any officer or official of the State of Indiana or any of its subdivisions. In fact, we have had no conversation with them since my conference Thursday afternoon with Mr. Hutson, head of the Indiana Labor Board, when I told him we would not make any agreement of any kind with any person or organization and we would not do anything which CIO or SWOC might claim as any arrangement or settlement with them. Our position is exactly the same now.

"Several days ago we submitted an informal confidential memorandum to the Governor of Indiana describing, at his request, what our labor policy had been prior to the strike. We stated in our memorandum in the first paragraph and again in the last paragraph that it was confidential for information of the Governor only and must not and could not be used, employed or construed by any person or organ-

ization whatsoever as a contract, agreement or settlement. In fact it was not signed but was transmitted with a letter advising that it was confidential and could not be used in any other way. In our letter we pointed out that our employees are demanding that they be permitted to return to work and that the State owes them the legal obligation of protection from violence. Our plant at South Chicago has been operating for several days and we shall open our plant at Indiana Harbor within 48 hours regardless of any picketing."

Mr. Argetsinger sent the following telegram to Governor Townsend of Indiana Sunday evening:

HON. M. CLIFFORD TOWNSEND,
Governor of Indiana,
Indianapolis, Ind.

The press advises me the pickets are being withdrawn from Youngstown Sheet & Tube Co. plant at Indiana Harbor and you have made some statement inferring an arrangement or agreement with this company. I cannot believe this is correct. As you know, I advised you this company would not make any agreement or settlement that would involve or affect CIO and SWOC either through you or in any other way. Our confidential memorandum to you cannot be used in this manner, and we stated therein that it could not be used by any person or organization in any way as any sort of contract, agreement or settlement. Please correct erroneous impression your statement is reported to have created, as we wish our employees to know the truth before they return to work.

J. C. ARGESINGER.

Cleveland and Youngstown Steel Plants Rapidly Approaching Normal Operation; Second Strike Call a Complete Failure

CLEVELAND, July 13.—Steel plants in the Cleveland and Youngstown districts are rapidly approaching normal production following the collapse of the CIO strike. Republic Steel Corp. started up its Niles sheet mills at Niles, Ohio, and the Dilworth-Porter plant in Pittsburgh Monday, leaving only the N. & G. Taylor plant in Cumberland, Md., still idle.

Republic reports that, based on all of its units, its operations have recovered to over 80 per cent of normal. Its open hearth operations in the Youngstown district are now at 62 per cent of capacity, but this will be increased during the week.

All of its blast furnaces in the Youngstown district have resumed. Most of its plants in that district that operate at two or three turns are back to that rate of operations. With the exception of a few of its plants, as many men as can be used have returned to the various Youngstown district plants of Republic.

Republic's Corrigan, McKinney plant in Cleveland increased its open hearth operations this week to 12 out of 14 furnaces and 85 per cent of the men have returned to work at this plant. Its mill departments in Cleveland are again on regular schedules. A third blast furnace is scheduled to resume in

Cleveland tomorrow, leaving only one Republic blast furnace here still idle.

Youngstown Sheet & Tube Co. is back to normal operations in the Youngstown district. Most of its mills are running three turns, and six out of its seven blast furnaces are operating. Men have returned as rapidly as needed and some are waiting in the employment office for jobs.

Second Strike Call Fails

A clash occurred between the CIO forces and police Sunday night near the Republic Massillon works in Massillon, Ohio, in which one person was killed and several injured.

A new attempt was made late in the week to close down the Youngstown mills but this proved a complete failure. The men who had returned to work under the protection of state troops refused to

be influenced by this new wave of strike propaganda.

A mass meeting of Cleveland strikers and sympathizers held in the Public Square in Cleveland Friday night brought out a crowd of not over 1500. CIO speakers denounced Governor Martin L. Davey, Sheriff Martin L. O'Donnell and Mayor Harold H. Burton for calling out the National Guard to protect the mill employees so that they could return to work and the crowd repeatedly booed these officials when their names were mentioned. However, mention of the name of President Roosevelt brought out a mighty cheer.

At a conference of the city, county and military authorities held here Monday it was decided to begin the removal of the Ohio National Guard from Cleveland today, the authorities deciding that the situation is sufficiently quiet to start the exodus of troops.

Wage-Hour Bill, Greatly Simplified, Some Objectionable Features Removed, But May Not Be Able to Pass Congress

WASHINGTON, July 13.—Somewhat simplified and stripped of many objectionable features, but still regarded by many as far too complex for smooth administration, the revised Black-Connery wage and hour bill, as reported to the Senate by the Education and Labor Committee, still has several tough hurdles to make before finding a place on the statute books—hurdles which some observers say are insurmountable.

That the measure has finally reached the Senate floor, means little if anything. Its future is still uncertain. But if the House Labor Committee wrangles over the bill as the Senate committee is reported to have done and if the wholesale objections directed at the measure at the recent public hearings are to be regarded as criteria, then its chances for passage, even after further revision and simplification, are decidedly remote. One report has it that the House committee, under the chairmanship of Mary T. Norton, Democrat of New Jersey, would like to lay the bill quietly away for action next session. Credence may or may not be given that rumor, but there is every indication that individual members of the House committee have their own ideas about revising the bill.

Most observers see little hope for action on any legislation while the Supreme Court packing plan is rocking the Senate. And that goes for the bills the President says he wants passed; and the wage-hour bill is one of these, according to a recent White House statement. After the court plan is disposed of, it may be too late for other action.

Discretionary Power Removed

By action of the Senate committee, at least some of the discretionary power given the administrative board in the original wage-hour bill has been removed. Power to vary basic legislative standards for wages and hours, for example, has been eliminated. Instead, the new draft sets a minimum wage of 40c. per hr. and a maximum work week of 40-hr. as the accepted standards for the entire country. Exceptions below these standards would be within the scope of the board's power to grant.

Fixing of definite wage and hour standards and limiting the field of the Board's power was believed the result of conferences with the Department of Justice, which is understood to have advised against granting too much discretionary power to avoid the old NRA stigma—unconstitutional delegation of legislative authority.

In the field of higher wages and shorter hours, collective bargaining mechanism presumably would function. Abandoning this field is a concession to organized labor, although industrial spokesmen also were hostile to the far-flung investigating crusade which would have been established under the original bill covering "fair" wages up to \$1200.

Although no Southern wage differential is recognized, as had been urged by spokesmen from the South, the rewritten bill provides that the Board may classify employers, employees and employment "according to localities, the population of the communities in which such employment occurs, the number of employees employed, the nature and volume of the goods produced and such other differentiating circumstances as the Board finds necessary or appropriate."

The revised draft exempts from its provisions seamen, railroad employees except those in the lowest wage brackets, fishermen and all agricultural workers. Local retailing employees are classified with executive, administrative and professional workers as not being subject to the bill, but definitions of these terms may be interpreted by regulations of the Board.

No Exemption for Small Shops

Employers who, under the original bill had hoped to be exempted because they employed a small number of workers, will find no grounds for such anticipation in the new measure. No number had been specified in the old bill, but suggestions ranged upward from eight. Critics of the bill had pointed out that employees in that category were very definitely more in need of wage and hour standards than were the workers in big units of industry.

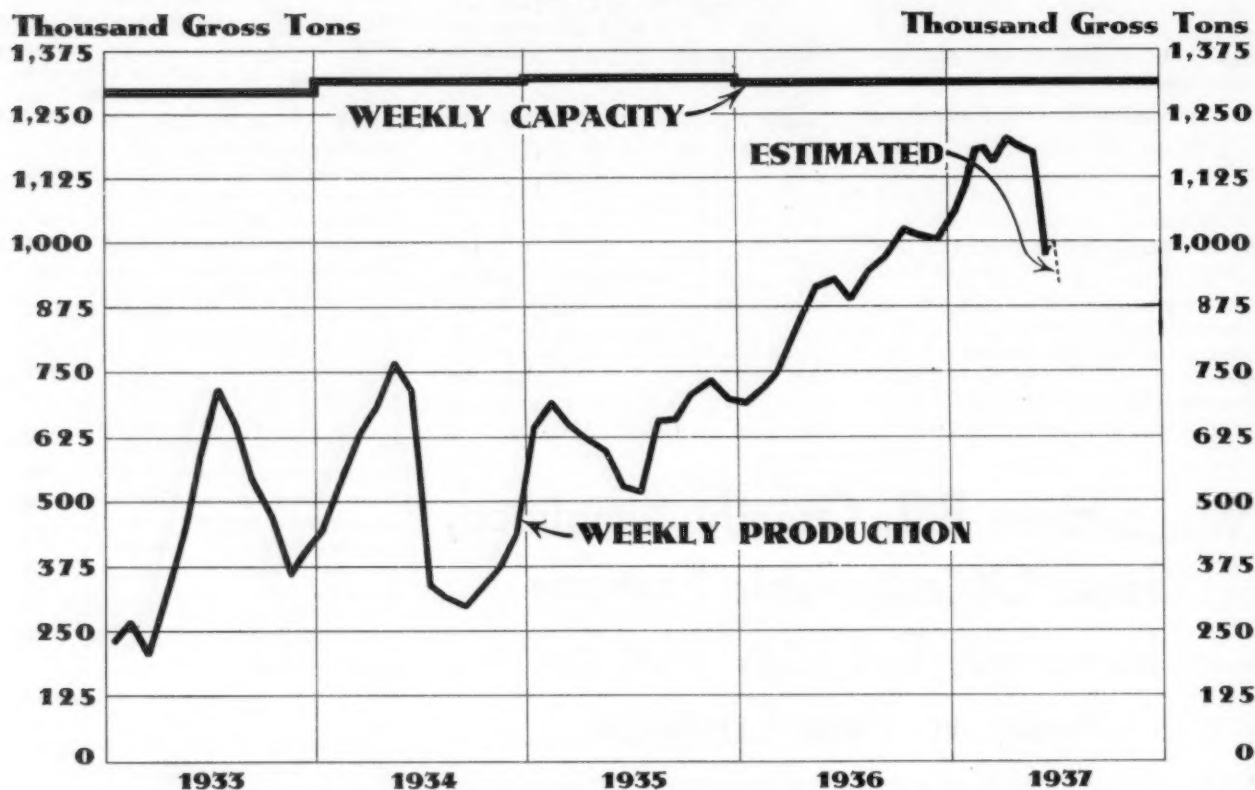
Also stricken from the bill by the Senate committee was the prohibition against employment of strike-breakers in production during labor controversies and of persons engaged in industrial espionage. However, Senator Thomas, Democrat, of Utah told THE IRON AGE he would press for separate legislation of this kind during the present session.

Conceding that "abrupt changes" might "do serious injury" to both workers and employers in eliminating substandard wages and hours from interstate industry, committee members pointed out that the revised bill provides for open hearings and for definite factors to be taken into consideration before wages and hours are fixed. Since that was substantially the procedure outlined in the former

(CONTINUED ON PAGE 98)

PRODUCTION

Average Weekly Production of Open-Hearth and Bessemer Steel Ingots by Months, 1933-1937, and Estimated Production by Weeks in 1937



Figures for the Current Week Are Not Indicated on the Chart Until the Following Week

STEEL INGOT PRODUCTION BY DISTRICTS: Per Cent of Capacity

	Current Week	*Last Week
Pittsburgh	86.2	69.0
Chicago	79.5	65.5
Valleys	75.0	73.0
Philadelphia	70.0	65.0
Cleveland	80.0	70.0
Buffalo	89.5	74.5
Wheeling	95.0	78.0
Southern	76.5	64.0
Ohio River	92.5	49.5
Western	95.0	79.0
St. Louis	91.0	76.0
Detroit	90.0	83.5
Eastern	70.0	81.5
Aggregate	83.0	70.0

* Allowance made for holiday.

Weekly Booking of Construction Steel

	July 13, 1937	July 7, 1937	Week Ended June 15, 1937	July 14, 1936	Year to Date 1937	1936
Fabricated structural steel awards.....	13,250	16,500	15,600	27,350	668,740	616,165
Fabricated plate awards.....	1,170	595	195	2,080	62,880	151,620
Steel sheet piling awards.....	0	0	430	2,920	35,555	25,540
Reinforcing bar awards.....	1,610	7,400	5,150	1,775	133,995	198,785
Total Lettings of Construction Steel...	16,030	24,495	21,375	34,125	901,170	992,110

...SUMMARY OF THE WEEK...

... Industry at 83 per cent and will go to 85 or higher by end of week.

o o o

... Resumption of work at Indiana Harbor works breaks steel strike decisively.

o o o

... Fourth quarter price announcements expected soon; steel scrap rises sharply.

WITH resumption of work at the Indiana Harbor works of the Youngstown Sheet & Tube Co., all of the major steel units that were affected by strikes are again operating. This, together with the starting up of mills that were closed for vacations last week, brings the average operating rate for the industry up to 83 per cent, and it will be 85 per cent or higher by the end of the week, when Sheet & Tube's Chicago district plant will be turning out steel and some units of Republic Steel Corp. will be on a better operating basis.

The Chicago average rate is 79½ per cent, but it will be 86 per cent by Friday, compared with 94 per cent just prior to the strike, but equal to the best rates that prevailed during April and the early part of May. Republic Steel Corp. is now averaging better than 80 per cent in its plants. Its operations in the Youngstown district, at 62 per cent, will be increased this week. All of its blast furnaces in that area have resumed production. Its Cleveland plant has 12 of 14 open hearth furnaces in operation and 85 per cent of its employees there have returned to work. The Youngstown Sheet & Tube Co. is on a normal operating basis in Youngstown.

The effect of holiday and vacation shutdowns last week was most noticeable in the Pittsburgh-Wheeling area. The Pittsburgh rate has rebounded 17 points to 86 per cent of capacity and the Wheeling rate is also up 17 points to 95 per cent.

INDICATIONS are that the industry will hold to an average rate of about 85 per cent during the remainder of July. Present operations in some products are possible through August and even

longer, but the continued decline in new business, unless arrested, may reduce rollings of other products by next month. Large backlogs exist in tin plate, sheets and heavy plates, but orders are needed for bars, strip steel, rails and some other items. Sheet backlogs are so extended that some buyers are now making reservations as far ahead as December at whatever price is in effect at shipping time. In view of this situation, there is a possibility that fourth-quarter prices may be announced within the next week or two so that consumers may make their plans for the fourth quarter. It is generally believed there will be no price advances except possibly on tin plate and pig iron.

The only reversal of the downward trend in new buying has come to a moderate extent from the automobile industry. General Motors has placed orders for fair-sized lots of sheets for 1938 models, and Ford Motor Co. is inquiring for sheets for 250,000 cars. A general buying movement from the automobile industry is expected within the next few weeks for its new models. This activity is already reflected in pig iron purchases at Cleveland, where three orders totaling 15,000 tons have been placed for automobile castings. Other industries whose steel buying is on an undiminished basis are the manufacturers of farm tractors and electric refrigerators.

A SPECTACULAR rise in prices of steel scrap reflects partly the conviction of the usually foresighted scrap trade that the steel strikes have been decisively defeated and that steel buying should show signs of an upward trend before many weeks. There has been some mill buying of scrap at advanced prices, but the scrap price rise has been hastened by short covering by brokers on orders taken at higher than today's prices. Advances of \$1.50 at Philadelphia, \$1 at Chicago and 75c. at Pittsburgh have raised THE IRON AGE scrap composite price to \$18.50, a rise of \$1.08, which is more than occurred in any one week of the spring advance. A repetition of the first-quarter flurry is not unlikely, as reports are heard of scrap scarcity caused to a large extent by heavy exports.

Appraisal of fourth-quarter prospects for steel is generally favorable, based on resumption of automobile manufacturing of new models on a fairly large scale following curtailment during the changeover period of the next few weeks; farm prosperity that will result from abundant crops marketed at high prices; and further railroad buying of equipment as carloadings rise to autumn peaks. In addition, a growing export demand will take whatever surplus American mills may have to offer. British buying under reduced import duties has begun with the purchase of a fairly large tonnage of tin bars for Welsh tin plate mills.



...PITTSBURGH...

... Operations higher after holiday and vacation shutdowns; below recent peak.

o o o

... Incoming business in reduced volume, but renewed activity is expected soon.

o o o

... Announcement of fourth quarter steel prices is expected shortly.

PITTSBURGH, July 13. — With holiday and vacation shutdowns out of the way, steel ingot output in the Pittsburgh district has rebounded 17 points to 86 per cent of capacity. This rate is several points below that existing previous to curtailments. The recession in ingot rate reflects a combination of lighter demand and decline in unfilled tonnages. Wheeling district output is up 17 points to 95 per cent of capacity.

Total incoming business in the past week, barring the holiday, was slightly better than in the previous period, but was still below the rate of shipments. Semi-finished specifications picked up somewhat, sheet orders remained steady and bar and strip bookings declined some.

A note of caution among buyers, the dearth of automobile buying as the changeover period approaches and natural seasonal influences account for the comparatively easier total steel demand. Nonetheless, incoming business is in larger volume than had been anticipated and there is a good chance that renewed activity will begin within the next month or two. This contention is based upon the probability of heavier automobile buying and anticipation of the greatly improved farm purchasing power. Some customers have placed business for delivery in the fourth quarter to carry price in effect at the time of shipment. This market condition is similar to that which existed during the second quarter, when third-quarter prices were announced much sooner than was the usual custom.

There is a possibility that some action may be taken in the near future regarding fourth-quarter prices. With little chance of price

advances except possibly on tin plate, such an announcement, if made, would probably reaffirm present quotations on the majority of steel products.

Pig Iron

New buying is spotty and some merchant iron producers are able to add to their depleted stocks. Sanitary manufacturers are still operating at record levels, although some falling off in this type of business on account of the seasonal factor is expected soon. Meanwhile, radiator manufacturers will be starting their fall program within the next month or so.

Semi-Finished Steel

So far this month demand for semi-finished steel is running ahead of the corresponding period in June. Orders this week have shown substantial improvement over a week ago. It is not expected that total specifications will show any downward trend, as most producers still find it necessary to allocate tonnages because of their own requirements.

Bolts, Nuts and Rivets

Although new business is a shade better than it has been for the past several weeks, the total volume is not much more than enough to support a 65 per cent operating rate. The improvement which has occurred is a result of better automobile releases, presumably involving some material for 1938 models. Orders from fabricating shops show little change from recent activity and a fair amount of tonnages are going to railroad repair shops. Miscellaneous demand is just about holding its own.

Bars

Discounting the holiday, aggregate hot rolled bar specifications

in the past week were about on a par with the previous period. The trend of buying, however, is still pointed downward, and producers do not look for exceptional activity until automobile makers finally complete plans for their 1938 model production program. Some orders for this purpose have been received, but the aggregate tonnage is small. Deliveries are a little easier, but some producers still have fair backlogs, depending on the size and grade. Some jobber buying is in evidence, but incoming business for the most part represents actual urgent requirements.

Cold Finished Bars

The volume of business so far this month is a little better than in the corresponding June period and orders this week show a greater total than in the previous week. Practically all of the improvement is due to specifications from automobile parts makers and involves moderate tonnages. Unfilled orders may be estimated at around four weeks, but deliveries can be made on certain sizes and grades in a week or more. General miscellaneous bookings show little change and are in almost all cases accompanied by immediate shipping instructions.

Reinforcing Bars

Both awards and new inquiries in the past week have been considerably lighter than in previous periods. This condition, however, may be temporary owing to holiday cessations. Some jobbers are well supplied with stocks, but quite a few others find their inventories comparatively low.

Steel Sheet Piling

The bids on the Mare Island, Cal., project for a coffer dam, which were to be taken on July 28, will be accepted on Aug. 11. Changes have been made on this job which will require more piling than had been originally planned. Estimated requirements are between 6000 and 7000 tons.

Plates and Shapes

Heavy plate and shape specifications have been declining for the past several weeks, although the recession has been moderate and orderly. This condition is not wholly unlooked for as the demand for heavy products has held up unusually well for the past several months. Fortunately, the leveling off is appearing at a time when other consuming sources will be able to take up some of the slack, especially orders from automobile manufacturers. Some quarters believe the falling off in the heavy products business is due to the decline in small structural projects.

A Comparison of Prices

Market Prices at Date, and One Week, One Month, and One Year Previous:
Advances Over Past Week in Heavy Type, Declines in Italics

Rails and Semi-finished Steel

Per Gross Ton:	July 13, 1937	July 7, 1937	June 15, 1937	July 14, 1936
Rails, heavy, at mill	\$42.50	\$42.50	\$42.50	\$36.37 1/2
Light rails, Pittsburgh	43.00	43.00	43.00	35.00
Rerolling billets, Pittsburgh..	37.00	37.00	37.00	30.00
Sheet bars, Pittsburgh	37.00	37.00	37.00	30.00
Slabs, Pittsburgh	37.00	37.00	37.00	30.00
Forging billets, Pittsburgh...	43.00	43.00	43.00	37.00
Wire rods, Nos. 4 and 5, P'gh	47.00	47.00	47.00	38.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb....	2.10	2.10	2.10	1.80

Finished Steel

Per Lb.:	Cents	Cents	Cents	Cents
Bars, Pittsburgh	2.45	2.45	2.45	1.95
Bars, Chicago	2.50	2.50	2.50	2.00
Bars, Cleveland	2.50	2.50	2.50	2.00
Bars, New York	2.78	2.78	2.78	2.30
Plates, Pittsburgh	2.25	2.25	2.25	1.90
Plates, Chicago	2.30	2.30	2.30	1.95
Plates, New York	2.53	2.53	2.53	2.19
Structural shapes, P'gh	2.25	2.25	2.25	1.90
Structural shapes, Chicago..	2.30	2.30	2.30	1.95
Structural shapes, New York	2.5025	2.5025	2.5025	2.16 1/4
Cold-finished bars, P'gh	2.90	2.90	2.90	2.25
Hot-rolled strips, P'gh	2.40	2.40	2.40	1.95
Cold-rolled strips, P'gh	3.20	3.20	3.20	2.60
Hot-rolled annealed sheets, No. 24, Pittsburgh	3.15	3.15	3.15	2.50
Hot-rolled annealed sheets, No. 24, Gary	3.25	3.25	3.25	2.60
Sheets, galv., No. 24, P'gh..	3.80	3.80	3.80	3.20
Sheets, galv., No. 24, Gary...	3.90	3.90	3.90	3.30
Hot-rolled sheets, No. 10, Pittsburgh	2.40	2.40	2.40	1.95
Hot-rolled sheets, No. 10, Gary	2.50	2.50	2.50	2.05
Cold-rolled sheets, No. 20 Pittsburgh	3.55	3.55	3.55	3.05
Cold-rolled sheets, No. 20 Gary	3.65	3.65	3.65	3.15
Wire nails, Pittsburgh	2.75	2.75	2.75	2.10
Wire nails, Chicago dist. mill	2.80	2.80	2.80	2.15
Plain wire, Pittsburgh	2.90	2.90	2.90	2.40
Plain wire, Chicago dist. mill	2.95	2.95	2.95	2.45
Barbed wire, galv., P'gh.....	3.40	3.40	3.40	2.60
Barbed wire, galv., Chicago dist. mill	3.45	3.45	3.45	2.65
Tin plate, 100 lb. box, P'gh..	\$5.35	\$5.35	\$5.35	\$5.25

On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

Pig Iron

Per Gross Ton:	July 13, 1937	July 7, 1937	June 15, 1937	July 14, 1936
No. 2 fdy., Philadelphia	\$25.76	\$25.76	\$25.76	\$21.3132
No. 2, Valley furnace	24.00	24.00	24.00	19.50
No. 2, Southern Cin'ti.....	23.69	23.69	23.69	20.2007
No. 2, Birmingham†	20.38	20.38	20.38	15.50
No. 2, foundry, Chicago*	24.00	24.00	24.00	19.50
Basic, del'd eastern Pa.	25.26	25.26	25.26	20.8132
Basic, Valley furnace	23.50	23.50	23.50	19.00
Malleable, Chicago*	24.00	24.00	24.00	19.50
Malleable, Valley	24.00	24.00	24.00	19.50
L. S. charcoal, Chicago	30.04	30.04	30.04	25.2528
Ferromanganese, Seab'd car-lots	102.50	102.50	102.50	75.00

†This quotation is subject to a deduction of 38c. a ton for phosphorus content of 0.70 per cent or higher.

*The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

Scrap

Per Gross Ton:	July 13, 1937	July 7, 1937	June 15, 1937	July 14, 1936
Heavy melting steel, P'gh...	\$19.50	\$18.75	\$18.25	\$14.00
Heavy melting steel, Phila...	19.25	17.75	17.25	12.25
Heavy melting steel, Ch'go...	16.75	15.75	15.75	13.25
Carwheels, Chicago	18.25	18.25	18.25	13.50
Carwheels, Philadelphia	19.75	19.75	19.75	14.25
No. 1 cast, Pittsburgh.....	19.25	18.75	18.25	14.75
No. 1 cast, Philadelphia	20.25	20.25	20.25	14.25
No. 1 cast, Ch'go (net ton)...	15.25	15.25	15.25	12.00
No. 1 RR. wrot., Phila.....	19.75	19.75	19.75	14.75
No. 1 RR. wrot., Ch'go (net)...	15.50	14.50	14.50	11.50

Coke, Connellsville

Per Net Ton at Oven:	July 13, 1937	July 7, 1937	June 15, 1937	July 14, 1936
Furnace coke, prompt	\$4.35	\$4.35	\$4.60	\$3.50
Foundry coke, prompt	5.00	5.00	5.25	4.00

Metals

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Electrolytic copper, Conn....	14.00	14.00	14.00	9.50
Lake copper, New York.....	14.12 1/2	14.12 1/2	14.125	9.62 1/2
Tin (Straits), New York.....	60.00	59.875	54.625	14.40
Zinc, East St. Louis.....	7.00	6.75	6.75	4.75
Zinc, New York.....	7.35	7.10	7.10	5.12 1/2
Lead, St. Louis.....	5.85	5.85	5.85	4.45
Lead, New York.....	6.00	6.00	6.00	4.60
Antimony (Asiatic), N. Y....	14.75	14.12 1/2	14.75	13.00

The Iron Age Composite Prices

Finished Steel

July 13, 1937
One week ago
One month ago
One year ago

2.605c. a Lb.
2.605c.
2.605c.
2.159c.

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strip. These products represent 85 per cent of the United States output.

	HIGH	Low
1937	2.605c., Mar. 9	2.330c., Mar. 2
1936	2.330c., Dec. 28	2.084c., Mar. 10
1935	2.130c., Oct. 1	2.124c., Jan. 8
1934	2.199c., April 24	2.008c., Jan. 2
1933	2.015c., Oct. 3	1.867c., April 18
1932	1.977c., Oct. 4	1.926c., Feb. 2
1931	2.037c., Jan. 13	1.945c., Dec. 29
1930	2.273c., Jan. 7	2.018c., Dec. 9
1929	2.317c., April 2	2.273c., Oct. 27
1928	2.286c., Dec. 11	2.217c., July 17
1927	2.402c., Jan. 4	2.212c., Nov. 1

Pig Iron

\$23.25 a Gross Ton
23.25
23.25
18.84

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

HIGH		LOW	
\$23.25, Mar. 9	9	\$20.25, Feb. 16	16
19.73, Nov. 24	24	18.73, Aug. 11	11
18.84, Nov. 5	5	17.83, May 14	14
17.90, May 1	1	16.90, Jan. 27	27
16.90, Dec. 5	5	13.56, Jan. 3	3
14.81, Jan. 5	5	13.56, Dec. 6	6
15.90, Jan. 6	6	14.79, Dec. 15	15
18.21, Jan. 7	7	15.90, Dec. 16	16
18.71, May 14	14	18.21, Dec. 17	17
18.59, Nov. 27	27	17.04, July 24	24
19.71, Jan. 4	4	17.54, Nov. 1	1

Steel Scrap

\$18.50 a Gross Ton
17.42
17.08
13.17

Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

HIGH			LOW		
\$21.92,	Mar.	30	\$17.08,	June	15
17.75,	Dec.	21	12.67,	June	9
13.42,	Dec.	10	10.33,	April	23
13.00,	Mar.	13	9.50,	Sept.	25
12.25,	Aug.	8	6.75,	Jan.	3
8.50,	Jan.	12	6.43,	July	5
11.33,	Jan.	6	8.50,	Dec.	29
15.00,	Feb.	18	11.25,	Dec.	9
17.58,	Jan.	29	14.08,	Dec.	3
16.50,	Dec.	31	13.08,	July	2
15.25,	Jan.	11	13.08,	Nov.	22

Inquiries this week are about evenly divided between factory additions and public works projects. The same may be said for awards. American Bridge Co. is furnishing 2550 tons of fabricated material for the Lincoln Tunnel, Weehawken, N. J. This company also obtained a contract involving 830 tons of plates and shapes for incinerator buildings at Detroit.

Sheets

Total sheet tonnages placed in the past week are about equivalent to the previous period, but on account of the holiday show a slight improvement on a daily basis. Automobile buying is off some owing to the proximity of the change-over period at many plants. Export business continues fair, with some orders carrying premiums of from \$5 to \$9 a ton above domestic quotations. Total tonnages booked in the past several weeks have shown little change, but there has been some increase in the diversification of orders. Jobber buying of galvanized sheets shows further improvement. Although some headway has been made on backlogs in this district, deliveries on all grades of sheets are still quite extended. Despite promises of speedier shipments in other districts, specifications being received in this area where deliveries are somewhat extended continue unabated.

Tubular Goods

Oil-country goods specifications have leveled off some in the past week, but this condition is not surprising in view of the heavy ordering which took place recently. Specifications for standard pipe from jobbers still continue at low ebb while demand for both stationary and locomotive boiler tubes shows little change from recent activity.

Wire Products

Manufacturers' wire bookings have slipped off a trifle, but a reversal of this trend is expected within the coming month owing to anticipated increase in automobile and furniture manufacturing operations. Demand for merchant wire items on the other hand has shown a noticeable improvement, orders for wire nails being especially in evidence. Some producers feel that the current pick-up in merchant wire orders, although slight, is a forerunner of a heavy anticipated fall business.

Tin Plate

Owing to resumption of tin mills recently closed on account of labor disturbances, tin plate operations may be estimated this week at approximately 95 per cent, up seven points from the level which existed

during the time operations at those plants were completely curtailed. A further gain in production is expected within the next week or so as mills make headway in reopening plants. Crop prospects at this time are exceptionally bright and should conditions turn out as now expected, tin plate manufacturers will be pressed to the utmost for material. Not only have packers' can specifications increased but there has been a substantial gain in general line can orders. For the first time in several years a condition has arisen whereby stocks of tin plate at mills, in anticipation of customers' requirements, are practically non-existent. Obviously, the strike and price advance have contributed to these circumstances but actual tin plate demand has exerted the most influence.

Strip

Total hot and cold rolled strip specifications have fallen off some in the past week. Part of the recession is undoubtedly due to the holiday and vacation schedules and a normal seasonal letdown in certain lines. Despite these influences, however, miscellaneous business made a good account of itself and included specifications from cash register, furniture and farm implement manufacturers. Automobile buying, owing to the proximity of changeover period, was noticeably light.

Refractories

Shipments to mills are still fairly brisk, but new orders have been light for the past several weeks. This condition was to be expected, however, as many steel companies had put in supplies previous to price advances, one of which was effective Jan. 1 and the other April 1. The present volume of new business closely approximates the trend in new steel specifications. Refractory manufacturers look for a revival of activity on a larger scale before the beginning of the fourth quarter, one factor supporting this opinion being the necessity for relining blast furnaces which have been consistently pushed for quite some time.

Coal and Coke

Coal activity is restricted to Lake movements as most industrial concerns still have a fair amount of stocks built up some time ago in anticipation of labor troubles. Furthermore, some buying is being deferred until definite prices have been set by coal commissions operating under the Guffey-Vinson Coal Act. Beehive coke markets continue quiet, although resumption of held-up shipments is expected soon. Spot business is light and practically all production is being ap-

plied on contracts. In line with producers' efforts to balance production and consumption, there were approximately 500 less beehive ovens operating in the Connellsville region on July 1 than were making coke on June 1. Active ovens are still operating on a three to four day a week basis.

Wage Hour Bill Greatly Simplified

(CONTINUED FROM PAGE 93)

draft, their statement was interpreted as seeking to allay the fears of many witnesses who at the recent hearings said that serious industrial disturbances and dislocations would result with the measure's passage. Committee members say that the bill assures industry the Board will proceed slowly and cautiously in promulgating its orders.

Numerous reports emanating from Washington describe the "emasculated" bill as innocuous. But many reliable sources not usually given to crying wolf see in the measure plenty of potentialities for making a bureaucrat's dream come true. They cite, for instance, the provision making the appointment of advisory committees mandatory—committees whose duties would include advising and otherwise assisting the labor standards board before it finally fixed wages and hours. It smacks so strongly of the old NRA set-up, they point out, that the very effectiveness of such committees is questioned, since they would be composed of representatives of employers, employees and impartial and disinterested persons. The board could name one for every 10 related industries or it could designate one committee for every industry. It is inconceivable, it is said, that the board would choose to select a smaller number of committees. Being imbued with the New Deal influence, they could hardly be expected to act otherwise. Presumably, the possibilities would be unlimited—a virtual spoilsman's paradise.

That the ghost of the former Blue Eagle, dead these many years, was hovering around the committee chamber while negotiations were under way, there seems little doubt. Members wrote into the bill a provision making compliance certificates optional with the board. Seasoned observers say there is little doubt that the five-man board would jump at the opportunity and adopt a revitalized blue bird or similar symbol not merely as a token of compliance but as an aggressive step to publicize the program.



CHICAGO

... Sheet & Tube mill resumes work; district rate will rise to 86 per cent.

... Buying of steel by automobile makers is expected within few weeks.

... Tractor manufacturers extremely busy and will continue so all summer.

CHICAGO, July 13.—With all district mills operating, including that of Youngstown Sheet & Tube Co., which opened this morning, ingot output this week is estimated at 79½ per cent. Youngstown estimates its operations will be at capacity by Friday morning, so the district rate by the end of the week will be around 86 per cent.

Despite the holiday last week, sales appear to have been slightly better than in the previous week, whereas specifications against old contracts are off somewhat, the change in either case being small. Rollers of plates are still unable to lessen appreciably their 12 weeks' quotation for delivery, since specifications on old orders, especially from railroads, are maintaining this backlog. A well-diversified demand for plates is reported. Car shops are busy, but there seems to be some hesitancy among railroads in coming out with further inquiries. With crop prospects the brightest in years, the possibility of further railroad car and rail buying seems more likely and some action is expected later in the year, although actual production may not be seen until 1938.

The most active steel consumers and the only ones that give promise of holding their activity at present levels through the summer are the tractor makers, whose sales are considerably ahead of last year, and who anticipate a high operating rate for some time to come. The implement trade is also busy now, but some slight letdown may be experienced in this industry before the end of the summer.

Automobile production is unchanged this week, but a decrease

is expected in a few weeks. Activity is developing in steel circles with regard to 1938 models, and some large tonnages are expected to be placed within the next few weeks. Nash plans to be down about three weeks this month, it has been reported.

A number of small private structural jobs have come out in the last week. The fabricators' strike in the St. Louis area has ended and a release of tonnage to that district has resulted. Fabricators here are generally displeased with the new mill quantity extras, which impose a high tax on small lots of shapes which are placed in conjunction with a large job by considering these additions as separate orders.

Scrap rose 50c. to \$2 a ton this week with No. 1 steel being marked up \$1 to \$16.50 to \$17 a ton on the basis of a mill purchase at the latter figure. Other advances were made throughout the list.

Pig Iron

Shipments thus far in July are about equal to the first two weeks in June, although there may be a slight letdown later in the month. Automobile foundries are least active of all, but in a few weeks, when 1938 model production is begun, these will take their places among the busiest. Foundries supplying railroad equipment makers, farm equipment manufacturers, including tractors, and machine tool builders are all well occupied. Third quarter books are well filled, and, although there is no impending shortage of iron seen, it cannot be had merely for the asking. Foundry coke shipments are paralleling those of iron rather closely.

Wire and Wire Products

Figures for June reveal that bookings during that period were about 20 per cent above those in May and, from the condition of the books thus far into July, it would seem that little reduction in this rate of activity will be seen. A leading seller, however, anticipates a letdown later in the month, which may extend into August. Deliveries are improved. Shipments on manufacturers' wire are practically prompt, it being possible to make delivery in a week to 10 days. Specifications from the farm equipment industry continue heavy, particularly from the tractor makers.

Structural Shapes

Inquiries are better this week, although few large jobs are being announced. Most of the work consists of small private projects, there being 128 small lots totaling 15,755 tons and about 2500 tons additional in some miscellaneous inquiries. Bids were taken this week on about 900 tons of shapes for four bridges in Indiana. An unstated tonnage for a Lady Esther building in the Chicago clearing house district, and 275 tons for a building in Michigan. In Beaumont, Tex., a Southern Pacific bridge is to require 800 tons of shapes, while on July 20 a highway bridge involving 500 tons will be out for bids at Denver. A number of small awards have been reported, all bridges, being awarded either to Worden-Allen Co. or to the Pittsburgh-Des Moines Steel Co. Shape deliveries can be made in three to four weeks.

Plates

Specifications against old railroad orders are fairly heavy and car shops are busy, although there is little new business being placed. The Milwaukee placed orders with its own shops for the 1000 gondolas and one locomotive listed last week as inquiries. Deliveries remain at about 12 weeks mainly because of the specifications against old orders and books are well filled until October. Incoming business is diversified and no particular source seems to be providing the bulk of the tonnage. About 8000 tons of plates will be required for a Shell pipe line which was awarded to A. O. Smith Corp.

Sheets and Strip

Deliveries on these products are not much improved, with the possible exception of cold rolled sheets which are currently not in great demand because of slackening in automobile production. Activity in

this industry is expected to assume large proportions soon again, however, and steel sellers are expecting some large tonnages within the next few weeks. Strip sales to the farm equipment trade have been good.

Bars

With shipments requiring about 30 days, bars are in best demand from tractor manufacturers and railroads. Automobile specifying has dropped off temporarily and, although there has been some buying, it cannot be identified as being destined for 1938 models.

Reinforcing Bars

This market is still showing little activity, the 1900 tons for the Post Office garage, bids on which were taken earlier in the week, being the largest job in this district at present. A hospital in Milwaukee will take 185 tons, and some Illinois State highway bridges in Rock Island and Clinton Counties, on which bids will be taken July 23, are expected to bring out some fair tonnages.

Warehouse Business

With the resumption of operations in all but one Chicago mill during the past week, warehouse stocks are being built up again to a comfortable position. Demand for sheets and strip still is great and is exceeding the supply, where as other products are enjoying a more even movement with no distinguishing characteristics. Interest in sheets is widely diversified with no manufacturers particularly active. June business was down from May, and July and August are also expected to be more quiet.

China Sees Financing Here for Purchases

WASHINGTON, July 13.—Purchase of an unnamed amount of American railroad equipment and machinery with financial aid from the Export-Import Bank is being sought by the Chinese Government, according to Chairman Jesse H. Jones of the Reconstruction Finance Corp. Mr. Jones said he did not believe the equipment is intended for military use, but is desired for normal business purposes made necessary by expansion of traffic which has increased beyond the ability of the present railroad capacity. Mr. Jones said he conferred last Friday with Chinese Ambassador C. T. Wang and Finance Minister H. H. King.

New York Shipyards Resume Operations

AFTER being shut down for almost a month by a dispute with the Industrial Union of Marine and Shipbuilding Workers of America, CIO affiliate, four plants of United Shipyards, Inc., Staten Island, Hoboken and Brooklyn, were reopened on July 12, although heavily picketed by strikers who demanded a closed shop agreement. About 900 men reported to the four yards, according to company officials. Heavy police details prevented interference of the men returning to work. The plant of the Brewer shipyard, which adjoins the Mariner's Harbor, S. I., plant of United, was also reopened on the same day.

Meanwhile, work proceeded quietly at the Robins Drydock & Repair Co. in Brooklyn, and the Tietjen & Lang plant in Hoboken, N. J., both subsidiaries of the Todd Shipyard Corp., which reopened last Thursday. Strong police guards protect both yards, which are still picketed.

Republic to Expand Gulf States Plant

REPUBLIC STEEL CORP., Cleveland, will spend about \$2,000,000 in the expansion of its Gulf States Steel division, Gadsden, Ala. Two 125-ton open hearth furnaces will be added, increasing the open hearth capacity 50 per cent. The sheet mill capacity will also be increased 50 per cent. Morgan Engineering Co., and Alliance Machine Co., Alliance, Ohio, have been awarded contracts for cranes and other machinery, including two 110-ton ladle cranes, a 75-ton

charging crane, a charging machine and equipment for stripping and handling ingot molds.

Wire Cartel Extended To July 31

LONDON (*Special Correspondence*).—As the negotiations for the reorganization of the International Wire Association have not yet been concluded, it has been decided to extend the duration of the temporary cartel agreement, which was to expire on June 30 last, to July 31.

Renewal of the cartel was announced last October. At a meeting then held in Brussels, Belgium, Holland, Luxemburg, Germany, Czechoslovakia, Poland, Hungary and Denmark agreed to the renewal.

Heppenstall Plant Closed by Strike

PITTSBURGH, July 13.—Approximately 900 employees of the Heppenstall Co., Pittsburgh, were made idle yesterday when union members of the Steel Workers' Organizing Committee went on strike while company officials, a Labor Board representative and SWOC officers were in conference negotiating the question of union recognition.

The walkout came without warning and the Heppenstall Co. has closed its plant indefinitely.

One of the questions under consideration at the time of negotiations involved the calling of a Government-supervised consent election, but with the strike being called when the company was considering this proposal and was in actual conference with union officials, the status of future meetings is uncertain.

ALL Steel Welded Truck Corp., Rockford, Ill., is now in production on its wire coil truck, designed with low clearance to enable coils to be rolled on to the deck with saving of both time and energy. The truck is equipped with a Clark lift jack.





PHILADELPHIA

... Operating rate rebounds to 70 per cent.

□ □ □

... Buying spotty but somewhat better.

□ □ □

... Exports show sharp increase.

PHILADELPHIA, July 13.— Taking its cue from a falling off in strike news and the upturn in Wall Street prices, sentiment among members of the trade here is decidedly better than it was two weeks ago. Today no mill representative questions the statement that operations will be maintained at close to the present level throughout the summer, with the likelihood that the fall will witness even a more urgent demand for steel.

The condition of sellers' books and the attitude of their customers back up these views. Although new orders have in certain instances tended to run under current shipments, the lack of balance has not been as serious as some observers had estimated. In addition, the reduction in import duties by Great Britain and the high prices offered in Europe and Japan for finished and semi-finished steel, have broken down mill resistance, and in many cases order books are well padded with foreign orders. The May statistics of the Department of Commerce for the first time reflects this foreign demand, with shipments of finished and semi-finished steels almost double the volume reported in April.

Also, scrap dealers here are riding a bullish market, a market which is a little too bullish according to some observers. Prices have jumped \$1.50 in some instances, and, considering the prices brokers have recently offered for large scrap accumulations (for instance, ships), it is apparent that a few brokers are gambling on far higher prices before the end of the year.

Local mill operations have fully recovered from shutdowns over the holiday period. The average rate for the district is now at 70 per cent of capacity, and it is unlikely that there will be a falling off of any magnitude over the next month.

Pig Iron

Dullness continues to rule this market. Sellers still are concerned with getting deliveries out to customers on schedule and are not a bit concerned over current apathy with regard to new commitments. It is generally realized that most melters are still fairly well covered against summer needs, and no furnace looks for a revival of buying interest until early September, at which time most melters will start getting worried about fourth-quarter supplies and will apply pressure to get favorable delivery positions or to get coverage against possible price advances. Department of Commerce export data for May reveal for the first time actual figures which are commensurate with the recent conjectures regarding heavy foreign sales. Total iron exports for that month were 117,598 tons, compared with 83,059 tons shipped in the four preceding months.

Shapes and Bars

Construction demand still fails to show the volume fabricators had anticipated earlier in the year. And from the small number of inquiries coming up for estimation, the future is none too attractive. Awards of shapes during the week were confined almost entirely to Belmont Iron Works, which company secured two jobs for du Pont aggregating 415 tons and a 130-ton building at Morton, Pa. Fort Pitt Bridge Works will fabricate 820 tons of shapes for the Philadelphia high school at Ogontz and Olney Avenues. All bids have been rejected on an inter-county bridge near Pottstown, Pa., and new tenders on this 320-ton project will probably be due in about three weeks. The only new job coming up during the week was a Middlesex County, N. J., bridge, requiring 160 tons, on which bids are due July 26. Reinforcing demand is very spotty and in poor volume.

All fabricators here are awaiting with interest some announcement on the much-delayed Publication Building, Washington, on which bids are due this Friday. This large project calls for 2400 tons of bars and 9600 tons of shapes.

Plates and Sheets

Most district mills report a slight upturn in miscellaneous demand for sheet mill products, although a few producers admit that steel is being rolled at a faster pace than new orders are coming in. A cursory examination of mill promise sheets indicates, however, that no inroads whatsoever have been made into backlogs. In fact, at least one of the larger producers reports a week increase in hot-rolled sheet promises, with the best delivery possible extending up to the first of December. Cold-reduced sheets are running comparatively easier, averaging around 10 weeks, whereas tin mill products are either not available at all or conditionally promised within four months. Several job stamping plants here have placed good sheet orders, and Philco has recently ordered 150 tons of sheets after shopping around for some time to get a satisfactory delivery promise. Several of the smaller producers have some heavy hot rolled stock available for delivery within five to six weeks. Plate demand is spotty and in negligible volume, and backlogs have been reduced fractionally in certain instances. Nonetheless, delivery within a month is the best time available, with six to eight weeks more typical of the market.

Imports

The following iron and steel imports were received here during the past week: 4610 tons of manganese ore from Cuba; 1123 tons of pig iron from British India; 43 tons of steel tubes, 34 tons of steel forgings and 44 tons of steel bars from Sweden.

Foundry Opens After 45 Years of Idleness

AFTER a lapse of 45 years, the gray iron foundry of Burden Iron Co., Troy, N. Y., was reopened on July 8. The casting of the first heat was attended by a large group of Troy business men and civic leaders, who observed the workmen molding and pouring valve parts and manhole covers. A core oven, which had not been used since 1892, was put into operation after being changed over from coke to electric firing. C. P. Franchot, president and general manager of the 128-year-old company, was host to the visitors.



...BOSTON...

... Industrial operations slowed up by heat and vacations.

BOSTON, July 13.—Pig iron buying continues in dribbling lots, mostly for immediate or nearby shipment, an indication that some foundries are operating on small inventories. Pig iron exports the past week, 8089 tons, to Japan.

Extremely hot weather the past week slowed up operations in all lines of industry, particularly the foundry, and, with the vacation season in full swing, gave a general appearance of slackness.

The regional shippers' advisory boards estimate New England will require 4701 cars for iron and steel in the third quarter, which compares with 3761 cars in the like period of 1936, an increase of 25 per cent.



...BIRMINGHAM...

... Republic Steel lets contracts for enlarging Gadsden plant.

BIRMINGHAM, July 13. — Contracts have been placed by the Republic Steel Corp. for the enlargement of the open hearth works of its Gulfsteel division at Gadsden. Two 125-ton furnaces have been ordered. Steel for the extension of the open hearth building has been placed with the Nashville Bridge Co., which has a plant at Bessemer. Construction work is expected to start in about a month.

A lease was signed last week between the Alabama Docks Commission and the Aluminum Ore Co., Pittsburgh, for a tract of 75 acres at the state docks, Mobile. This company is a subsidiary of the Aluminum Company of America and reports state that a bauxite ore smelting plant costing around \$4,000,000 is to be built. A few days previous to the announcement of the lease the company qualified to do business in Alabama to the amount of the above figure.

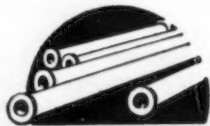
Twenty open hearths were in

operation most of last week and 19 during the remainder of the time. Two of the three open hearth plants were in full operation, Fairfield and Gadsden. This week 19 units are scheduled. Fairfield will work eight out of nine, Ensley five out of nine and Gadsden all six.

New pig iron and steel business continues to flow in at a moderate rate. Production is steady. There has been no change in blast furnace operation, all 18 remaining active.

Ingalls Iron Works is to furnish 185 tons of structural steel for the Cluett-Peabody plant addition in Atlanta. San Francisco has placed 500 tons of pipe with U. S. Pipe & Foundry Co. and about 300 tons with Central Foundry Co.

A report of the Woodward Iron Co. for the first six months of 1937 shows earnings of \$602,836.37, an increase of \$356,953.97 over the same period of 1936 and of \$214,791.88 over the last half of 1936.



...CAST IRON PIPE...

Nunda, N. Y., plans about 13,200 ft. of 6-in. for new line from water reservoir to village limits, where connection will be made with distributing system.

Port Arthur, Tex., plans pipe lines for extensions in water system; also new well development to provide 1,000,000-gal. capacity and other waterworks installation. Cost over \$85,000. M. D. Gates is city engineer.

Seymour, Tex., closes bids July 20 for 29,020 ft. of 6 and 8-in.; also for 150,000-gal. elevated steel tank and tower, pipe fittings, valves, etc. Joseph E. Ward, Harvey-Snyder Building, Wichita Falls, Tex., is consulting engineer.

Alamo Heights, Tex. (suburb of San Antonio), has authorized new 6 and 8-in. lines for extensions in water system; also pumping equipment and accessories. Cost about \$58,000. Bond issue is being arranged. W. E. Simpson & Co., Milam Building, San Antonio, are consulting engineers.

Ogden, Utah, plans 18 and 20-in. pipe for new trunk line for water supply in Southern part of city. Cost about \$72,000.

Claffin, Kan., plans pipe lines for water system and other waterworks installation. Estimates of cost are being made. F. E. Devlin, W-K-H Building, Wichita, Kan., is consulting engineer.

Municipal Light and Water Department, Richland Center, Wis., asks bids until July 27 for 30-in. pipe for condensing water intake and discharge lines for municipal power plant, with alternate bids on concrete pipe. H. C. Carroll, Commercial Testing & Engineering Co., 307 North Michigan Avenue, Chicago, is consulting engineer.

Port Washington, Wis., has low bid of \$72,000 from Guilford W. Falcon, Evanston, Ill., for new waterworks intake line into Lake Michigan, requiring 3600 ft. of 18-in. pipe.

Appleton, Wis., has placed 6000 ft. of 6-in. water pipe with James B. Clow &

Sons Co., and 10,000 ft. of copper service pipe with Mueller Co., Decatur, Ill.

Cuba City, Wis., will take bids soon for pipe lines for water system extensions; also new deep-well pumping equipment and accessories. Cost about \$30,000, of which \$25,000 is being arranged through bond issue. Kuelling & Jeffrey, Lancaster, Wis., are consulting engineers.

North Bend, Marshfield, Coquille, East Side and Empire, Ore., plan development of joint water supply, with construction of 110-ft. dam at water source in Coos County, and 36-mile main pipe line to serve municipalities noted, with water reservoirs and pipe lines in each municipal area. Cost about \$2,000,000. R. L. Cavanaugh and E. K. Burton, city engineers of North Bend and Marshfield, respectively, are in charge.

Safford, Ariz., has awarded 3000 tons of 10-in. to United States Pipe & Foundry Co.



...PIPE LINES...

Memphis Natural Gas Co., Sterick Building, Memphis, Tenn., plans extensions in main welded steel pipe line from Monroe, La., gas field, including installation of compressor stations for booster service near Lula, Miss., Wilmot, Ark., and other points. Cost over \$500,000. B. L. Johnson is president.

Consumers Gas & Fuel Co., Miami, Fla., plans extensions in pipe line system for gas distribution. Cost over \$50,000.

Palmetto Co., Harlingen, Tex., recently organized by W. P. Lincoln, Harlingen, and associates, plans welded steel pipe line from oil field at El Tanque, Starr County, Tex., to bulk loading plant in Santa Cruz Hill district, Harlingen, for crude oil transmission. A pipe line gathering system also will be built.

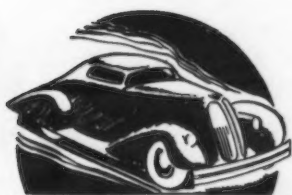
Crown Central Petroleum Corp., Houston, Tex., plans 4-in. steel pipe line gathering system in Saxet oil field, Neuces County, terminating in Cantwell district, about 10 miles in all. From last noted point 12-in. welded steel pipe line will be built to terminal plant on Houston ship channel where two 55,000-bbl. steel storage tanks and loading facilities will be installed.

Lordsburg, N. M., plans steel pipe line system for natural gas distribution. Cost about \$44,000. Financing has been arranged through Federal aid.

Michigan-Toledo Pipe Line Corp., Mount Pleasant, Mich., has begun extensions of welded steel pipe line from Mount Pleasant to Toledo, Ohio, about 175 miles, to include new pumping stations for booster service for crude oil transmission at Mount Pleasant, Chelsea, Crystal and other points, and additions to existing booster stations at East Lansing and Riverdale, to double present capacity. Cost about \$375,000.

Detroit City Gas Co., 415 Clifford Street, Detroit, plans extensions and replacements in pipe lines for natural gas distribution in different parts of city, to include meters and service facilities. Work will be carried out in connection with general expansion and improvements in stations and systems during 1937, for which a total appropriation of \$2,108,000 has been authorized. Company is arranging for early financing in gross amount of \$5,000,000, and will provide appropriation of \$1,600,000 in 1938 and 1939, respectively, for similar purposes.

Imperial Oil, Ltd., Winnipeg, Man., has approved plans for new welded steel pipe line in Bear Rapids area, northwest Canada, about nine miles long, for oil transmission.



... CLEVELAND ...

... Operations rise as strike-affected mills get back to normal rate.

... ..

... Ford Motor Co. to order sheets for 250,000 cars; General Motors buys moderately.

... ..

... Generally, however, the trend of new business continues to decline.

CLEVELAND, July 13.—Ingot output increased 10 points to 80 per cent of capacity in the Cleveland-Lorain district this week, the increase resulting from the starting up of five additional open hearth furnaces at the Corrigan, McKinney plant of the Republic Steel Corp., thus restoring normal operations at this plant after interruptions caused by strike. In the Youngstown district there was a two point gain to 75 per cent of capacity, and this rate probably will be increased during the week.

Incoming business in finished steel continues rather light. While miscellaneous demand still shows a downward trend, this decline was offset during the week by a revival in buying of sheets by some of the motor car plants for 1938 models. These purchases were not as large as are made when the motor car plants are under heavy production, but in the aggregate they made up considerable tonnage. The business was distributed among several mills. In addition, the Ford Motor Co. will purchase 100,000 tons of steel in sheets and other form for the 250,000 cars, according to estimates of steel sales departments.

Miscellaneous consumption of steel products apparently is not holding up to recent levels, as some metal working plants report a seasonal slowing down in their operations. One exception is the refrigerator industry, which is still going strong, and at least two large manufacturers have made additional purchase of sheets. Agri-

cultural implement manufacturers also continue to maintain good operations. Activity in the building field continues light. Railroad buying is limited to miscellaneous requirements.

Deliveries are still improving, particularly on sheets, strip steel and bars. While most producers still have good backlogs of sheet orders, some mills are now in need of hot strip business.

Pig iron showed more activity the past week than for some time, three good-sized orders being placed, the largest being for 8000 tons.

Pig Iron

Activity was increased during the week by the sale of some good-sized lots. One consumer bought 8000 tons, another 5000 tons and a third 2000 tons. Considerable of this iron will be used in making automobile castings. Shipments by producers that were affected by strikes show a gain over June, but the movement from other furnaces is probably lighter than last month. Not much iron is being shipped to motor car foundries and there has been a slowing down in the demand from the heating industry. Shipments to agricultural implement foundries continue good. With a seasonal decline in their business some miscellaneous consumers are holding up deliveries.

Sheets

Buying of sheets for 1938 automobiles was given a good start late in the week by purchases of moderate-sized lots by General Motors units, largely for Chevrolet cars.

Included were purchases by the Fisher Body Corp. for its Cleveland and other plants. The Ford Motor Co. is inquiring for sheets for making 250,000 cars and is expected to place this business this week. Miscellaneous business is fair. Additional orders have come from some of the refrigerator manufacturers for this season's models and a seasonal slowing down in this industry is not yet in evidence. Miscellaneous demand continues fair, although there has been some slowing down in business from the building field. Mills that were idle or on reduced operations several weeks are now taking care of their old orders and deliveries are gradually growing easier, although they are still extended until September on galvanized sheets.

Strip Steel

Strip steel appears at present to be the quietest item among finished steel products. Some makers of hot rolled strip have reduced their backlogs to the extent that they need new business to keep their mills operating, this being particularly true of the narrow sizes. Makers have enough orders to keep their cold strip mills operating through July. Automobile parts plants have taken deliveries on practically all the steel covered by their old contracts and are not yet placing tonnage for new models.

Wire Products

With a seasonal decline in the demand and shipments heavier than incoming business, backlogs are being gradually reduced. However, mills have enough business on their books to keep them busy until early fall, when an increase in orders is expected. Mill operations of the leading producer are at about 75 per cent of capacity. Jobbers still have good stocks and, as present prices are expected to be extended through the fourth quarter, there is not much incentive at present to buy for stock. With conditions in the farming districts very favorable, a good agricultural demand is looked for in the fall.

Bars, Plates and Shapes

With little demand from the motor car industry, business in hot rolled bars still shows a downward trend, and some mills would like additional tonnage to fill in their rolling schedules. While deliveries are promised in three or four weeks, a buyer in urgent need of steel can secure earlier shipment. There is not much activity in shapes and plates. The only sizable new structural project is the Lorain Avenue grade crossing elimination in Cleveland, requiring 500 tons, which is being readver-

tised. When bids were asked for several weeks ago there were no bidders because contractors regarded the estimate too low.

Iron Ore

The strike at the four mines of the International Harvester Co. in the Mesaba Range ended today,

after a conference last night between counsel for the company, the CIO and the Employees' Assn. of the International Harvester Co. The National Labor Relations Board will hold an election to ascertain which organization has the majority for collective bargaining.



... Business quieter, but operations are high.

TORONTO, July 13.—Canadian iron and steel companies are depending on small tonnage spot orders and large backlogs to maintain plant operations at their present high levels. New commitments are limited for many lines of steel, although there has been good booking of pig iron for third quarter delivery. Inquiries for various materials are appearing, but specifications are for smaller quantities than those reported a couple of months ago. The vacation period has tended to slow down activities in some quarters, while other concerns with big backlogs are pushing operations at capacity. The automotive industry is ordering in a small way, taking materials for clean-up of early 1937 car models, but a revival of big buying from this source is expected late in the summer.

Officials of the various steel companies state that backlogs and new business in prospect will enable them to keep their plants at the present high operation ratio to the end of the year at least. There seems to be little prospect of further changes in prices of finished and semi-finished materials for the immediate future and forward delivery booking is being done at current prices.

Merchant pig iron sales show minor reduction. Foundries are taking delivery against contracts. Producers look upon the decline in demand as one of short duration and are maintaining production at the recent high level, piling merchant iron against future sales. Imports continue light with practically no iron coming in from Britain. Prices are firm and unchanged.

With the exception of reduction in dealers' buying prices in the Montreal area, scrap markets show

practically no change from the preceding week. Demand for both iron and steel grades is sustained, with dealers unable to fill all orders for cast scrap and possibility of a shortage later in the year.



*... Awards of 1610 tons
—825 tons in new projects.*

AWARDS

Belchertown, Mass., 177 tons, State water basin, to Morrison-Stevens Co.

New York, 150 tons, Swift & Co. building, to Bethlehem Steel Co.

Buffalo, 400 tons, additional sludge digestion plant for Buffalo Sewer Authority, to Buffalo Steel Co., Tonawanda.

Toledo, Ohio, 300 tons, vocational school, to Truscon Steel Co.

Rossford, Ohio, 300 tons, Libbey-Owens-Ford Glass Co., to Hausman Steel Co., Toledo.

Sacramento, Cal., 176 tons, Sacramento airport, to Truscon Steel Co.

Lincoln County, Colo., 103 tons, bridge, to an unnamed bidder.

Cheyenne, Wyo., 115 tons, State bridge, to an unnamed bidder.

NEW REINFORCING BAR PROJECTS

Avalon, N. J., 115 tons, highway bridge.

Springfield, Ohio, 400 tons, Crowell Publishing Co. building.

Pittsburgh, 100 tons, Banksville Road; Booth & Flynn Co., low bidders.

Dayton, Ohio, 100 tons, Rike-Kumler Co. store; Frank Messer & Sons, Cincinnati, general contractors.

Milwaukee, 185 tons, veterans' hospital.

State of Illinois, unstated tonnage, bridges in Moline and Clinton and Rock Island Counties; bids July 23.

Denver, 122 tons, railroad underpass; bids July 20.



Utah Copper Co. is inquiring for three 30-ton caboose cars.

Canadian National has placed an order with National Steel Car Corp., Hamilton, Ont., for 30 sand cars.

Milwaukee Road will build 1000 gondola cars and one locomotive in its shops.

RAILS AND TRACK SUPPLIES

St. Louis Southwestern has placed an order for 3000 tons of standard rails with Carnegie-Illinois Steel Corp.

U. S. Steel Shipping Heavily By Water

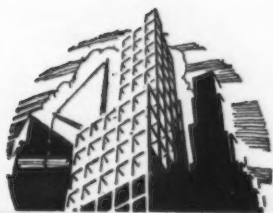
INTERLAKE waterways are being used this year to a greater extent than heretofore by the United States Steel Corp. for interlake shipments of pig iron and semi-finished steel. Shipments of 40,000 tons of pig iron are being made from the Central furnaces, Cleveland, of the American Steel & Wire Co., to this company's Worcester works, about 30,000 tons of which has already been transported. The iron goes to Buffalo on a U. S. Steel Lake freighter, from there to Beacon, N. Y., by canal barges and the remaining 240 miles of the 855-mile trip by rail.

From the Lorain works of the National Tube Co., 25,000 tons of billets have been shipped to the Allentown, Pa., works of the American Steel & Wire Co. These went by boat to Buffalo, by barge to Jersey City and from there to Allentown by rail, a total distance of 788 miles of which only 92 miles was by rail.

New Tantalite Find in Australia

LONDON (*Special Correspondence*).—Representatives of Japanese and German steel concerns have gone to Darwin, Western Australia, to inspect the deposits of tantalite which have been found in an area 30 miles wide and 100 miles in length south of Darwin.

Commercial deposits of tantalite are very rare. The metal is used for hardening steel and is of great value in the manufacture of surgical instruments and armaments. Its price has risen recently from \$1500 to \$3000 per ton.



...NEW YORK...

... Steel business at low point but shipments are heavy.

o o o

... Some reservations in sheets and plates for fourth quarter.

o o o

... Pig iron export business active in small lots.

NEW YORK, July 13.—New business in steel has declined almost to the vanishing point, but specifications against contracts are in good volume. There is no holding up of shipments by consumers and, in fact, some buyers are pressing for a hurrying up of shipments. This situation indicates that steel is being rapidly consumed, but that buyers are in no hurry to cover their requirements beyond their present commitments. An exception, however, must be made of products on which mills are heavily booked, particularly sheets and plates, some buyers having asked mills for reservations as far ahead as December.

Companies that have recently resumed production at strike-bound plants are not wholly out of the woods so far as smooth operations is concerned, but each day makes their performance a little better and strike difficulties may be no more than a memory within a week or two unless fresh troubles break out.

Freedom from further labor troubles would place the steel industry as a whole in a position to make almost a record for midsummer production. It is possible that July and August output will come second only to that of the same two months in 1929.

Pig Iron

Buying is on a moderate scale, with sales somewhat in excess of that anticipated by sellers, who felt that a combination of inventory and a seasonal diminution of melting activity would affect buying interest to a greater extent than it has. Inquiries for sub-

stantial tonnages specifying shipment in August or earlier, if possible, are numerous. Furnaces are booked well into the future. Imports are practically nil, and, according to all indications the second half of the year will see a much higher export figure than the first. In addition, there is a lack of sizable stocks in furnace yards. These factors are causing buyers to devote a good bit of thought lately to the question of how iron prices will act in the future if domestic consumption is increased to any extent, as is logical to expect if general conditions continue to improve. Shipments abroad, particularly to China, are well maintained. The bulk of export inquiry continues to involve small lots, mostly under 2000 tons. Sweden is reported currently interested in moderate tonnages of bessemer iron.

Plates and Sheets

New impetus was given the sagging plate market by the re-entry of refinery equipment fabricators, who placed orders for steel after marking time for many weeks. The reopening of strike-bound shipyards in the metropolitan area under heavy police protection has yet to be reflected in any new commitments for material. It is expected that bids will shortly be re-advertised on the United States Line's vessel, said to require 15,000 to 16,000 tons of plates. No new railroad business is in sight, although it is believed that the awards will be made before the end of the week on the 100 cars for the city-owned subway, reported last week.

Sheet business fell off materially during the holiday week, although

shipments compared favorably with those of the first week of June. Sales of specialty grades, such as stainless and enameling stock, are well sustained, most of the material being for architectural purposes. Most orders on standard grades are for fill-in to replenish unbalanced stocks, which are high on many gages. Deliveries are unchanged.

Wire

New wire business took a sharp drop as a result of the holiday and the lassitude occasioned by the hot weather. Deliveries are improving and, with stocks fairly high, there is no particular incentive for either jobbers or manufacturers to place orders. Fabricated wire continues to move in good volume.



...CINCINNATI...

... New business in sheets declines.

o o o

... Ingot output higher after vacation shut-downs.

CINCINNATI, July 13.—Sheet steel purchasing the past week receded sharply from recent peaks. The trade appears sanguine, however, that present decline is merely seasonal. Automotive ordering is getting better as production of new models gets under way. Delivery of hot rolled annealed sheets is still extended, in some instances to the end of the third quarter. Cold rolled sheets, however, can be had for fairly prompt shipment. Mills are running full this week, following brief lay-offs for vacations in some units.

Ingot production is up sharply, with relighting of open hearths at the Middletown unit of American Rolling Mill Co. Thirty-one open hearths out of 34 are in operation this week.

Pig iron demand is all but absent. Melters, feeling a sag in demand for castings, are reluctant to extend present inventories and ordering is confined to small lots for urgent needs. The melt was off sharply last week as some foundries shut down for vacations. Machine tool castings demand has eased, but the stove melt is fairly active.



... Prices slashed by jobbers on reinforcing bars.

BUFFALO, July 13.—Few sizable reinforcing bars tonnages have been placed during the past week. Makers say the price situation, which has been confused since early spring, is still unsatisfactory. Prices now are definitely lower and the cutting which has prevailed all along on large jobs has now extended to the 10 or 15-ton lots, on which it is quite customary to run into slashes of \$8 or \$9 a ton.

No important tonnage has been placed in the fabricated structural field. The 250-ton University of Buffalo gymnasium job is still in abeyance. Four hundred tons of reinforcing material for the Buffalo sewage disposal plant has been placed in addition to the 200 tons reported last week.

Operations of Buffalo plants are as follows: Lackawanna plant of Bethlehem Steel Co., 28 open hearths; Republic Steel Corp., seven; Wickwire Spencer Steel Co., three.

Pig iron business continues good, with operations of blast furnaces the same.



... 3000 tons of cast iron pipe awarded for water supply projects.

SAN FRANCISCO, July 12.—Award of 3000 tons of 10-in. cast iron pipe to U. S. Pipe & Foundry Co. featured the iron and steel market on the Pacific Coast last week. This award is a portion of a Safford, Ariz., water supply project. Further awards will not be made until additional appropriation is made for completion of the project. At Portland, Ore., U. S. Pipe & Foundry Co. was low on 400 tons of 6, 8 and 12-in. cast

iron pipe for a water supply system.

Awards of both reinforcing and structural steel were light. An award of 365 tons of shapes to Minneapolis-Moline Power Implement Co. by the American Smelting & Refining Co., Garfield, Utah, was the largest letting.

Bids will be opened July 20 on 521 tons of structural steel to be used in the construction of a railroad underpass and approaches at Denver. On July 27 bids will be opened on 471 tons of shapes for Lake Britton bridge in Shasta County, Calif.

During the remainder of 1937, 42 highway and bridge construction projects will be completed in the State of Washington, according to a recent announcement from the Washington State highway director. Total cost will be approximately \$6,500,000, of which Federal funds will amount to \$2,000,000 and State funds about \$4,500,000.

Business is still seasonally light and mill activity has decreased somewhat.



... Structural fabricators settle strike by wage rise and 40-hr. week.

ST. LOUIS, July 13.—The strike of 435 workers in 18 structural steel fabricating plants in the St. Louis industrial district, which began June 10, was settled on July 8, when the men returned to work. The settlement provides for a wage increase of 9c. an hr., 3c. retroactive to May 20, and a 40-hr. week. Local Union No. 518, affiliated with the International Association of Bridge, Structural and Ornamental Iron Workers of America, an American Federation of Labor union, was recognized as the bargaining agent for its members, but the plants maintain their open shop policy. The strike is still on at one plant.

The first reaction of the settlement of the strikes in structural fabricating plants was the requesting of shipments of shapes, which had been held up for a month. Resumption of operations in steel mills affected by strikes brought forth a flood of requests for information as to deliveries of orders already booked. Virtually all business has been reinstated, as there were no cancellations from

sympathetic customers. Sheets continue most in demand. Stocks of wire products in hands of jobbers are being liquidated, but mills are receiving virtually no new business.

There has been a slight let-up in the melt of pig iron during the week. The jobbing foundries here and elsewhere in the St. Louis area report a slowing up of business. The stove foundries in the Belleville district are operating on their summer schedule of five days a week. The agricultural implement plants in the Tri-cities were closed down for the week for vacation. Operations in the steel mills continue at the peak. Sales of pig iron were light.

Italy to Build Up Its Iron Industry

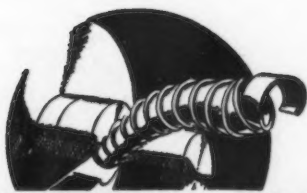
LONDON (Special Correspondence).—That Italy should be able to produce within her own frontiers most of the iron and steel she needs is clearly regarded by Signor Mussolini as a question of prime importance. Replying to a telegram from the board of the Iron Finance Co., which was recently formed in order to realize the principles of self-sufficiency in the Italian iron industry, the Duce says he is confident that this object will be achieved in the shortest possible time.

"If," Mussolini declares, "there is a sector, after that of the nation's bread, in which it is necessary to reach the maximum self-sufficiency, it is that of iron. There is no longer any time to lose."

Wales to Import Steel from U. S.

LONDON (Special Correspondence).—Arrangements have just been completed for the importation of a substantial quantity of American sheet bars to meet the demands of the Welsh tinplate and sheet industry. For some time past the industry has been severely handicapped through a shortage from the Welsh steel works, due to the lack of sufficient pig iron.

The decision to reduce the British import duty from 20 to 12½ per cent on certain classes of iron and steel will, it is stated, facilitate imports from the United States until domestic supplies of raw materials, such as iron ore and steel scrap, become more normal.



THIS WEEK'S MACHINE ...TOOL ACTIVITIES...

... Orders and inquiries are off in Middle West; are more active in the East.

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... Carrier Engineering plans \$250,000 re-equipment program in connection with centralization of activities at Syracuse.

o o o

... Some improvement seen in deliveries at Cincinnati.

Chicago

WITH June seasonally off from May, machine tool sellers here are anticipating a continuation of this downward trend during July and August, with the hot weather, general slowing down of business, and the growing practice of many plants toward closing down for a week for vacations all contributing factors. Deliveries are not better, except in a few instances, and here only slight improvement is seen. Labor disturbances are lessening, and consumer interest reflects this fact. Carnegie-Illinois Steel Corp. is inquiring for some milling machines, while a La-Crosse, Wis., manufacturer is interested in 26 presses. The Edison General Electric Appliance Co., Chicago, is inquiring for a few large presses. Allis-Chalmers' plans for its new tractor motor are still indefinite, but the company is said to be considering estimates from outside manufacturers for comparison purposes. Reports that tool prices are due for another advance appear to be unfounded.

Pittsburgh

INQUIRIES have continued their upward trend, and there has been an increase in the number of lists coming out. Some include from three to six machines, and this trend is taken as an optimistic note in view of the fact that requests for data several weeks ago involved for the most part single items. Westinghouse Electric & Mfg. Co. has been inquiring recently for a number of machine tools. Orders have been in fair volume and show little change from recent activity, although the improvement in inquiries portends

an upward movement in new business. Some dealers feel that the better tone of the market has resulted from the setback given irresponsible labor leadership. It is reported Carnegie-Illinois Steel Corp. has ordered some machine tools for its new Irvin works. Construction of the roll and machine shop was started last week and is being rushed.

Cincinnati

WARM weather influences are restricting current machinery business in this area. Bookings the past week were down to about 60 per cent of capacity output, but the trade is not worried. The attitude of users is good, and the feeling is simply that vacation periods are here and that there is no need to buy beyond immediate necessity. While business from strike areas is still slow, demand from other areas is reflecting seasonal influences. Inquiry has eased a bit, but manufacturers still have a substantial quantity in quotation and waiting for buyers' action.

Operations are consistently high, but backlogs are being regularly reduced. Shipment is closer to buyer requirements. Labor conditions are undisturbed.

Cleveland

MACHINERY buying quieted down more noticeably the past week, and there is not much new inquiry. About the only business pending here is an inquiry for about 15 machines for Cleveland's public school system. Bids close July 19, and delivery by Sept. 1 is requested. This list includes 10 lathes, one turret lathe, three grind-

ers, and certain specialty items. The Aluminum Co. of America, which recently bought machinery for a West Coast plant, is said to be contemplating the purchase of forge shop equipment for its Cleveland plant. Inquiry has not been issued. Otherwise prospects at the moment for July business are rather dull, and so far buying this month has lagged behind June volume. Hot weather and vacations are providing an interruption as usual at this season. Deliveries still fail to show much improvement, and undoubtedly the placing of some orders is being held up on this account.

New York

ALTHOUGH a decline in new orders is noticeable, more than one factory representative reports making his sales quota for the week. Orders for single tools predominate. Inquiries continue in good volume, particularly from some of the leading concerns in the East, which indicates that closures will be made before the month is out. The only possible threat to a better than seasonal July business is possible strikes in some of the leading shops, upon whom demands have been made by recently formed CIO units. The two principal manufacturers in Schenectady, both of which have been active machinery buyers in recent months, for example, are considering demands for a 40-hr. week, together with a closed shop and the check-off. Outstanding among the week's inquiries is the equipment being lined up by the Carrier Engineering Corp., Newark, N. J., in preparation for its contemplated move to Syracuse, N. Y. Over \$250,000 worth of machine tools are said to be involved, provided delivery can be made in time. The company would like to have most of the new machinery for its consolidated shops delivered during October, and many sellers whose best delivery is six months are in a quandary as to how to get in on some of this business. Deliveries in general remain practically unchanged from recent weeks.

Swedish Iron Ore Exports at New High

LONDON (Special Correspondence).—Iron ore shipments by the Grangesberg Co., Sweden's great iron ore producer, rose to the record figure of 1,098,000 tons in June. The previous high record was 980,000 tons, set up in April. This is the first time over 1,000,000 tons has been shipped in a month during the present agreement with the Swedish Government.

Total shipments in the first nine months of the present financial year were 7,683,006 tons. The last financial year's total of 8,654,000 tons was considered unusually good.



FABRICATED STEEL

... Lettings decline to 13,250 tons from 16,500 tons last week.

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... New projects lower at 9000 tons as against 16,200 tons in the previous week.

o o o

... Plate awards call for 1170 tons.

NORTH ATLANTIC STATES

Springfield, Mass., 100 tons, Monarch Life Insurance building, to Bethlehem Fabricators, Inc., Bethlehem, Pa.

Thomaston, Conn., 610 tons, Seth Thomas Clock Co. building, to Lehig Structural Steel Co., Allentown, Pa.

Wallingford, Conn., 160 tons, Wallingford Steel Co. addition, to Berlin Construction Co., Berlin, Conn.

Lackawanna, N. Y., 155 tons, Baker Homes housing project, to Buffalo Structural Steel Co., Buffalo.

Weehawken, N. J., 2550 tons, contract MHT-23, New Jersey approach, Lincoln Tunnel for Port of New York Authority, to American Bridge Co.

Woodbridge, N. J., 250 tons, State bridges, route 35, to Bethlehem Steel Co.

Bound Brook, N. J., 150 tons, Bakelite cafeteria, to Savary & Glaeser.

Philadelphia, 830 tons, high school, Ogontz and Olney Avenues, to Fort Pitt Bridge Works Co., Pittsburgh.

Morton, Pa., 145 tons, Philadelphia Electric Co. addition, to Belmont Iron Works, Philadelphia.

Monaca, Pa., 390 tons, highway bridge, to Fort Pitt Bridge Works Co.

Oil City, Pa., 350 tons, highway bridge, to Guibert Steel Co., Pittsburgh.

Edge Moor, Del., 225 tons, E. I. duPont de Nemours building addition, to Belmont Iron Works.

Baltimore, 170 tons, Rustless Iron & Steel Co. building, to Baltimore Steel Co.

Curtis Bay, Md., 200 tons, waste acid building for E. I. duPont de Nemours & Co., to Belmont Iron Works.

THE SOUTH

State of Virginia, 580 tons, bridge over James River, to Virginia Bridge Co., Roanoke, Va.

Winston-Salem, N. C., 170 tons, colored hospital, to Carolina Steel & Iron Co., Greensboro, N. C.

Alabama City, Ala., 2025 tons, extension to open-hearth building, Republic Steel Corp., to Nashville Bridge Co., Nashville, Tenn.

Miami, Fla., 570 tons, hangar, Pan-American Airways, to Ingalls Iron Works Co., Birmingham.

Oldham and Deaf Smith Counties, Tex., 170 tons, bridge, to Central Texas Iron Works.

CENTRAL STATES

Niles, Ohio, 220 tons, building for Niles Glass division, General Electric Co., to Niles Forge & Mfg. Co., Niles.

Detroit, 830 tons, Wayne County incinerator buildings, to American Bridge Co.

Richmond, Ind., 1150 tons, Crosley Radio Corp. plant, to Bethlehem Steel Co.

Nishkoro, Wis., 215 tons, overhead bridge, to Worden-Allen Co., Milwaukee.

La Crosse, Wis., 150 tons, bridge, to Worden-Allen Co.

Stanton County, Neb., 190 tons, I-beam span, to Pittsburgh-Des Moines Steel Co., Pittsburgh.

WESTERN STATES

Glendive, Mont., 190 tons, bridge, to Pittsburgh-Des Moines Steel Co.

Cheyenne, Wyo., 310 tons, overhead pedestrian crossing, to an unnamed bidder.

Bigtimber, Mont., 185 tons, bridge, to Pittsburgh-Des Moines Steel Co.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

Stockbridge, Vt., 150 tons, State bridge.

Norwich, Vt., 150 tons, State bridge.

New Britain, Conn., 350 tons, factory building, Landers-Frary & Clark.

New York, 280 tons, Dollar Savings Bank building addition.

Chester, N. Y., 500 tons, State highway bridge.

Middlesex County, N. J., 160 tons, bridge; bids July 26.

Pottstown, Pa., 320 tons, inter-county bridge; bids rejected, and new tenders in about three weeks.

Pittsburgh, 270 tons, eyebars and rods, Pennsylvania Railroad.

Allegheny County, Pa., 550 tons, Glenwood bridge.

Wilkes-Barre, Pa., 350 tons, Comerford Theaters, Inc., building.

Odenton, Md., 250 tons, State bridge over Pennsylvania Railroad.

Ilchester, Md., 240 tons, building, Bartgis Storage & Printing Co.

THE SOUTH

Baumont, Tex., 800 tons, Southern Pacific bridge.

CENTRAL STATES

Cleveland, 500 tons, New York Central grade crossing elimination, Lorain Avenue; new bids July 27.

St. Joseph, Mich., 450 tons, building and warehouse for 1900 Corp.; bids taken.

Shelbyville, Ind., 500 tons, State bridge.

Brownstown, Ind., 185 tons, bridge; bids taken.

Longnecker, Ind., 200 tons, bridge; bids taken.

Chicago, unstated tonnage, Lady Esther building; bids taken.

State of Wisconsin, 100 tons, three bridges; bids close July 23.

McPherson, Kan., 500 tons, derrick.

WESTERN STATES

Denver, 650 tons, addition to hotel, Patterson Estate.

Denver, 520 tons, railway underpass; bids July 20.

Shasta County, Cal., 470 tons, Lake Britton bridge; bids July 27.

Helena, Mont., 250 tons, Tongue River dam; J. C. Boesplug, low bidder on general contract.

Seattle, 300 tons, Ruby dam construction; bids advanced to July 22.

FABRICATED PLATES

AWARDS

Tullytown, Pa., 760 tons, five hopper barges for Warner Co., to Welding Engineers.

Hammond, Ind., 410 tons, tank, to Chicago Bridge & Iron Works.

SHEET PILING

NEW PROJECTS

Queens, N. Y., 2500 tons, Beach Channel Drive.

New Koppers Process Used in Refinery

THE Atlantic Refining Co. has placed in operation at its Philadelphia refinery the first plant in the East which will purify refinery gas by the new Koppers phenolate process. The plant was erected by Koppers Co.'s Engineering & Construction Division.

Koppers Co. also has just completed a similar type of plant to purify natural gas at Wayne, W. Va., for the Chartiers Oil Co. It will be placed in operation about Aug. 1, will remove 95 per cent of the hydrogen sulfide in the gas and will have a capacity of 5,000,000 cu. ft. a day.

This new patented Koppers process is adaptable for the recovery of hydrogen sulfide from natural gas and refinery still gases, with purification efficiency varying from 95 to 99.8 per cent. This renders the gas suitable for treatment in a polymerization unit for production of liquid hydro-carbons.

The plant built for the Atlantic Refining Co. will be able to recover the hydrogen sulfide from 22,000,000 cu. ft. a day of refinery still gases at 225 lb. pressure. The hydrogen sulfide may be converted to sulfuric acid and the purified still gas will be further processed by polymerization.



...NON-FERROUS...

... Copper demand recedes; quotations unchanged.

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... Zinc prices up 1/4c. to 7.35c., New York; buying in good volume.

o o o

... Tin buyers show new interest in futures.

NEW YORK, July 13.—Copper buying interest had slackened considerably from last week's high points, and consumer interest is centered chiefly upon

positions in September and beyond. Company affiliated fabricators are again accounting for most of the activity, at quotations which continue unchanged at 14c. per lb.,

Connecticut Valley, for the electrolytic grade. British copper was generally a bit weaker throughout the week, with today's price of 14.15c. per lb., c.i.f., usual Continental base ports, being 0.25c. under last week's price level.

Lead

The volume of sales established early last week continues well maintained at a steady price level of 6c. per lb., New York. Consumers are 90 per cent covered on July requirements and 40 per cent on July, hence August buying predominates. Outside of a sentimental effect which might stimulate consumer commitments, the advance in spelter prices should have little influence on lead quotations. Buying was well distributed over broad lines, although battery makers showed greater activity than they have for some time. London futures were down slightly from 5.53c. per lb. last week to 5.44c. this week. Spot metal is available in London at 5.50c. per lb.

Zinc

Statistics on domestic slab zinc show a decrease in stocks of 307 tons, indicating that there has been no fundamental change in the metal's position. For the first time since July, 1936, production was in excess of shipments, the amount being 307 tons. These favorable statistics, the continued tightness of spot metal, and the improved buying interest evidenced during the week, combined to lift the price level to 7.35c. per lb., New York, the first price movement since April 20 when quotations were established at the 7.10c. level. Sales of prime Western for the week were 13,841 tons. Shipments amounted to 3551 tons, and undelivered metal rose to 63,199 tons. Sympathetic London prices rose to 5.20c. per lb. this morning on first call.

Tin

Tin buyers took in a fair tonnage of metal, indicating particular interest in future positions, possibly owing to the fact that July and nearby positions are growing scarce. Professional buyers were the mainstay of the market, with only a small portion of the offerings being taken by the tin plate makers whose reentry into the market has been eagerly awaited. After daily fluctuations during the course of the week, Straits metal is quoted today at 60c. per lb., New York, an advance of 0.125c. over last week. A strengthened British market quoted Straits metal on first call this morning at £266 10d for spot shipment, and £265 15d for futures.

The Week's Prices. Cents Per Pound for Early Delivery

	July 7	July 8	July 9	July 10	July 12	July 13
Electrolytic copper, Conn.*	14.00	14.00	14.00	14.00	14.00	14.00
Lake copper, N. Y.	14.125	14.125	14.125	14.125	14.125	14.125
Straits tin, spot, New York	59.75	59.625	59.375	...	59.25	60.00
Zinc, East St. Louis	6.75	6.75	6.75	6.75	7.00	7.00
Zinc, New York	7.10	7.10	7.10	7.10	7.35	7.35
Lead, St. Louis	5.85	5.85	5.85	5.85	5.85	5.85
Lead, New York	6.00	6.00	6.00	6.00	6.00	6.00

*Delivered Connecticut Valley; price 1/4c. lower delivered in New York.
Aluminum, virgin 99 per cent plus 20.00c.-21.00c. a lb. delivered.
Aluminum No. 12 remelt No. 2 standard, in carloads, 19.00c. to 19.50c. a lb., delivered.
Nickel, electrolytic, 35c. to 36c. a lb. base refinery, in lots of 2 tons or more.
Antimony, Asiatic, 14.75c. a lb., prompt, f.o.b., New York.
Quicksilver, \$93.00 to \$95.00 per flask of 76 lb.
Brass ingots, commercial 85-5-5-5, 14.00c. a lb., less carload, delivered; in Middle West 1/4c. a lb. is added on orders for less than 40,000 lb.

From New York Warehouse	
Delivered Prices, Base per Lb.	
Tin, Straits pig...	60.50c. to 61.50c.
Tin, bar	63.75c. to 64.75c.
Copper, Lake	15.00c. to 16.00c.
Copper, electrolytic	15.00c. to 16.00c.
Copper, castings	14.75c. to 15.75c.
*Copper sheets, hot-rolled	21.78c.
*High brass sheets	19.75c.
*Seamless brass tubes	22.50c.
*Seamless copper tubes	22.625c.
*Brass rods	16.25c.
Zinc, slabs	8.00c. to 9.00c.
Zinc, sheets (No. 9), casks, 1200 lb. and over	12.75c.
Lead, American pig	7.00c. to 8.00c.
Lead, bar	8.00c. to 9.00c.
Lead, sheets, cut	10.50c.
Antimony, Asiatic	15.50c.
Alum., virgin, 99 per cent plus	22.50c. to 24.00c.
Alum., No. 1 for remelting, 98 to 99 per cent	19.50c. to 21.00c.
Solder, 1/2 and 1/2	35.00c. to 36.00c.
Babbitt metal, commercial grade	25.00c. to 65.00c.

*These prices, which are also for delivery from Chicago and Cleveland warehouses, are quoted with 33 1/4 per cent allowed off for extras, except copper tubes and brass rods, on which allowance is 40 per cent.

From Cleveland Warehouse	
Delivered Prices per Lb.	
Tin, Straits pig	63.00c.

Tin, bar	65.00c.
Copper, Lake	15.00c. to 15.25c.
Conner, electro-lytic	15.00c. to 15.25c.
Copper, castings	14.75c. to 15.00c.
Zinc, slabs	8.25c. to 8.50c.
Lead, American pig	6.50c. to 6.75c.
Lead, bar	10.00c.
Antimony, Asiatic	16.50c.
Babbitt metal, medium grade	25.50c.
Babbitt metal, high grade	67.00c.
Solder, 1/2 and 1/2	39.50c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	10.75c.	11.50c.
Copper, hvy. and wire	10.125c.	10.625c.
Copper, light and bottoms	9.125c.	9.375c.
Brass, heavy	6.125c.	6.75c.
Brass, light	5.00c.	5.75c.
Hvy. machine composition	9.00c.	9.50c.
No. 1 yel. brass turnings	7.375c.	7.875c.
No. 1 red brass or compos. turnings	8.75c.	9.25c.
Lead, heavy	4.625c.	5.00c.
Cast aluminum	12.125c.	13.25c.
Sheet aluminum	13.25c.	14.75c.
Zinc	3.50c.	3.875c.



IRON AND STEEL SCRAP

... Practically all markets advance, as No. 1 steel rises 75c. at Pittsburgh, \$1.50 at Philadelphia.

... Composite price at \$18.50, up \$1.08.

JULY 13.—Following the advance made last week for the first time since March 30, the scrap market has gained further strength, with *THE IRON AGE* composite figure shooting up over \$1 to \$18.50. No. 1 steel quotations are up \$1.50 at Philadelphia, \$1 at Chicago and 75c. at Pittsburgh. The Philadelphia move is predicated upon a small scale into consumption at \$19.50 together with broker coverage at \$19 for this and older orders, some at a loss. Short coverage is also noted at Pittsburgh, where brokers are paying as high as \$19.50 to cover \$19.50 sales into consumption, with scrap apparently hard to pick up. Dealers in Chicago seem reluctant to part with their material, hoping for even higher prices, while brokers' offerings are already 50c. above the last high sale. Prices for other materials have advanced from 25c. to \$2 almost throughout the list, with the exception of Cleveland, where little new buying is anticipated. In the face of practically no new export sales, the present bullish sentiment is directly attributable to the settlement of the steel mill strikes.

Pittsburgh

The market shows further signs of strength, with brokers hurriedly covering shortages in fear of higher prices than are now quoted. A small tonnage of No. 1 steel was sold into consumption last week at \$19.50 a ton, but at present no dealers are willing to take additional orders at this price. In fact, brokers have paid \$19.25 for No. 1 steel and in some cases are now paying \$19.50 a ton, with scrap apparently hard to pick up. An added factor in the local market tending toward further strength is the action of outside brokers competing in this market with local dealers for available scrap. The former are hurriedly covering on sales made at higher prices. In view of the above factors, No. 1 steel becomes quotable at \$19.25 to \$19.75, up 75c. a ton from last week's prices.

Chicago

Following soon after a mill purchase last week at \$16.25 came an

other at \$17, on the basis of which No. 1 steel is now being quoted here at \$16.50 to \$17, up \$1 from last week. Brokers are even now understood to be offering \$17.50 unsuccessfully for steel, so the bullish effect of the ending of the steel strikes is seen to be taking effect as rapidly and to as great an extent in the scrap market as was predicted a few weeks ago. Advances ranging from 50c. to \$2 a ton were made throughout the list. Brokers report dealers are reluctant to release their material unless on old high-priced orders, and that they are awaiting higher prices. Most mills have sizable stocks on hand, but they apparently wish to maintain their piles as investments, or so their coming into the market would indicate. The Rock Island is offering today 120 cars of scrap, half of which contain No. 1 steel, expected to bring \$18.

Philadelphia

A wave of optimism has reached this market, mostly as a reflection of lessened strike tension in Mid-Western mills and the higher prices bid on recent railroad lists. Brokers also insist that scrap is not coming into dealers' yards in any real volume. A small lot of No. 1 steel was sold to a district consumer last week at \$19.50, and brokers are freely offering \$19 to cover this order as well as to liquidate, in some instances at a loss, some old orders still on books. Northern Metal Co., this city, was high bidder at \$660,000 for some of the boats offered by the Maritime Commission.

Cleveland

The market has a firmer tone since the strike-affected mills have resumed operations and are again taking scrap. All suspensions of shipments have been lifted, and a Youngstown district mill has purchased a small tonnage of No. 2 heavy melting steel. However, as most consumers have a large amount of scrap either in their stock piles or due on outstanding contracts, not much new buying is expected for several weeks. Youngstown district prices on steel-making grades have advanced 50c. a ton. Prices in Cleveland are unchanged.

Buffalo

While no sales by dealers have been reported, it is apparent that the market is stronger than it has been for some time. One mill here has paid \$19.50 for No. 1 railroad steel during the disposal of recent lists. Purchasers agree that it would be difficult to obtain a tonnage of No. 1 heavy melting steel for less than \$18.50, as compared with \$17.50 and \$18 on the last two important sales of No. 1, some four weeks ago. There is heavy shipping on old orders with thousands of tons yet to come.

Boston

A further strengthening of bundled skeleton, steel turnings and mixed borings and turnings prices has stimulated business somewhat. Bundled skeleton is now \$11.90 to \$11.95 a ton on cars, as against \$11.25 to \$11.30 a week ago and \$10.75 to \$10.90 on July 1. For turnings the general price is \$8.30 a ton on cars, as against a top of \$8.25 last week. Quite a few chemical borings are being shipped to gas purification plants for which the market is around \$9 a ton. The domestic heavy melting steel market is quite firm, but not actually higher and not high enough to detract material from the export market. Export prices are unchanged.

New York

The market tone is definitely stronger, and dealers have advanced their buying prices 50c. a ton on the entire list. Few sales have been made into consumption, however, and no new export buying is reported, although it has just come out that the British placed a sizable tonnage through the cartel three weeks ago. Bethlehem Steel Co. is said to have placed an open order for No. 2 steel with a Brooklyn dealer at \$14.50 a ton on cars.

Cincinnati

Higher bids on recent rail lists, combined with better sales prices on small scattered lots of old material, strengthened the district market the past week. Dealers' bids are up 50c. and activity in the trade is stronger. While no substantial mill buying is reported, the dealers, in anticipation of long expected buying, are moving the market into firmer tone.

St. Louis

An East Side melter bought 10,000 tons of heavy melting steel during the week at \$1 a ton above the price it had paid in its preceding purchase. The transaction was made with four dealers, and the scrap is to be delivered during the next 60 days. This sale shoved dealers' prices up 50c. a ton on selected heavy steel, Nos. 1 and 2 heavy melting and No. 2 railroad wrought. The situation generally is stronger. Only a small amount of material is coming in from the country, and strike embargoes are lifted. Railroad lists include Missouri Pacific, 60 carloads, and Kansas City Southern, 600 tons.

Iron and Steel Scrap Prices

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	\$19.25 to \$19.75
Railroad hvy. mltng.	20.50 to 21.00
No. 2 hvy. mltng. steel.	17.00 to 17.50
No. 2 RR. wrought	19.25 to 19.75
Scrap rails	21.00 to 21.50
Rails 3 ft. and under.	24.50 to 25.00
Comp. sheet steel	19.25 to 19.75
Hand bundled sheets.	17.00 to 17.50
Hvy. steel axle turn.	17.25 to 17.75
Machine shop turn.	14.00 to 14.50
Short shov. turn.	14.50 to 15.00
Mixed bor. & turn.	14.50 to 15.00
Cast iron borings	14.50 to 15.00
Cast iron carwheels.	19.00 to 19.50
Hvy. breakable cast.	14.50 to 15.00
No. 1 cupola cast.	19.00 to 19.50
RR. knuckles & cplrs.	24.50 to 25.00
Rail coil & leaf springs	24.50 to 25.00
Rolled steel wheels.	24.50 to 25.00
Low phos. bl let crops.	24.50 to 25.00
Low phos. sh. bar	24.00 to 24.50
Low phos. punchings.	22.00 to 22.50
Low phos. plate, hvy.	23.00 to 23.50
Low phos. plate clips.	21.00 to 21.50
Steel car axles	24.50 to 25.00

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	\$17.00 to \$17.50
No. 2 hvy. mltng. steel.	16.00 to 16.50
Comp. sheet steel	16.50 to 17.00
Light bund. stampings.	12.50 to 13.00
Drop forge flashings.	16.00 to 16.50
Machine shop turn.	11.00 to 11.50
Short shov. turn.	12.00 to 12.50
No. 1 busheling	15.50 to 16.00
Steel axle turnings.	13.50 to 14.00
Low phos. billet and bloom crops	23.50 to 24.50
Cast iron borings	12.50 to 13.00
Mixed bor. & turn.	12.50 to 13.00
No. 2 busheling	12.50 to 13.00
No. 1 cast.	19.00 to 19.50
Railroad grate bars.	11.50 to 12.00
Stove plate	9.50 to 10.00
Rails under 3 ft.	23.00 to 23.50
Rails for rollings	21.00 to 21.50
Railroad malleable	20.50 to 21.00
Cast iron carwheels.	21.50

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	\$19.00 to \$19.50
No. 2 hvy. mltng. steel.	16.50 to 17.00
Hydraulic bund., new.	18.00 to 18.50
Hydraulic bund., old.	14.50 to 15.00
Steel rails for rolling.	21.00 to 21.50
Cast iron carwheels	19.50 to 20.00
Hvy. breakable cast.	18.50 to 19.00
No. 1 cast.	20.00 to 20.50
Stove plate (steel wks.)	14.50 to 15.00
Railroad malleable	19.00 to 19.50
Machine shop turn.	13.00 to 13.50
No. 1 blast furnace	12.50 to 13.00
Cast borings	11.50 to 12.00
Heavy axle turnings.	15.00 to 15.50
No. 1 low phos. hvy.	23.50 to 24.00
Couplers & knuckles	23.50 to 24.00
Rolled steel wheels	23.00 to 23.50
Steel axles	25.50 to 26.00
Shafting	23.50 to 24.00
No. 1 RR. wrought	19.50 to 20.00
Spec. iron & steel pipe	16.50 to 17.00
No. 1 forge fire	16.00 to 16.50
Cast borings (chem.)	14.00 to 14.50

CHICAGO

Delivered to Chicago district consumers:

Per Gross Ton

Hvy. mltng. steel.	\$16.50 to \$17.00
Auto. hvy. mltng. steel, alloy free	15.50 to 16.00
No. 2 auto. steel	14.00 to 14.50
Shoveling steel	16.50 to 17.00
Hydraul. comp. sheets	15.50 to 16.00
Drop forge flashings.	14.00 to 14.50
No. 1 busheling	15.50 to 16.00
Rolled carwheels	20.50 to 21.00
Railroad tires, cut	22.00 to 22.50
Railroad leaf springs.	21.00 to 21.50
Steel coup. & knuckles	19.50 to 20.00
Axle turnings	15.50 to 16.00
Coil springs	22.50 to 23.00
Axle turn. (elec.)	16.50 to 17.00
Low phos. punchings.	20.50 to 21.00
Low phos. plates, 12 in. and under	20.50 to 21.00
Cast iron borings	10.50 to 11.00
Short shov. turnings.	11.00 to 11.50
Machine shop turn.	9.50 to 10.00
Rerolling rails	20.00 to 20.50
Steel rails under 3 ft.	19.50 to 20.00
Steel rails under 2 ft.	20.50 to 21.00
Angle bars, steel	19.50 to 20.00
Cast iron carwheels	18.00 to 18.50
Railroad malleable	19.00 to 19.50
Agric. malleable	16.50 to 17.00

Per Net Ton

Iron car axles	\$24.50 to \$25.00
Steel car axles	21.50 to 22.00
No. 1 RR. wrought	15.25 to 15.75
No. 2 RR. wrought	15.25 to 15.75
No. 2 busheling, old.	8.50 to 9.00
Locomotive tires	18.00 to 18.50
Pipes and flues	13.50 to 14.00
No. 1 machinery cast.	15.00 to 15.50
Clean auto. cast.	14.00 to 14.50
No. 1 railroad cast.	14.00 to 14.50
No. 1 agric. cast.	13.00 to 13.50
Stove plate	11.00 to 11.50
Grate bars	12.50 to 13.00
Brake shoes	11.50 to 12.00

BUFFALO

Per gross ton, f.o.b. consumers' plants:

No. 1 hvy. mltng. steel.	\$18.00 to \$18.50
No. 2 hvy. mltng. steel.	16.00 to 16.50
Scrap rails	19.50 to 20.00
New hvy. b'ndled sheet	16.00 to 16.50
Old hydraulic bundles	15.00 to 15.50
Drop forge flashings	16.00 to 16.50
No. 1 busheling	16.00 to 16.50
Hvy. axle turnings.	13.50 to 14.00
Machine shop turn.	12.00 to 12.50
Knuckles & couplers.	21.00 to 22.00
Coil & leaf springs.	21.00 to 22.00
Rolled steel wheels.	21.00 to 22.00
Low phos. billet crops.	21.50 to 22.00
Shov. turnings	13.00 to 13.50
Mixed bor. & turn.	12.50 to 13.00
Cast iron borings	12.50 to 13.00
Steel car axles	20.00 to 21.00
No. 1 machinery cast.	17.50 to 18.00
No. 1 cupola cast.	16.50 to 17.00
Stove plate	14.00 to 14.50
Steel rails under 3 ft.	22.00 to 23.00
Cast iron carwheels.	17.50 to 18.00
Railroad malleable	19.50 to 20.00
Chemical borings	12.50 to 13.00

BIRMINGHAM

Per gross ton delivered to consumer:

Hvy. melting steel	\$16.00 to \$16.50
Scrap steel rails	17.00
Short shov. turnings.	9.00 to 10.00
Stove plate	10.00
Steel axles	18.00 to 19.00
Iron axles	16.50 to 18.00
No. 1 RR. wrought.	13.00 to 15.00
Rails for rolling	18.00 to 20.00
No. 1 cast	16.00 to 18.00
Tramcar wheels	16.00 to 18.00

ST. LOUIS

Dealer's buying prices per gross ton delivered to consumer:

Selected hvy. steel.	\$15.50 to \$16.00
No. 1 hvy. melting.	15.50 to 16.00
No. 2 hvy. melting.	14.00 to 14.50
No. 1 locomotive tires.	18.50 to 19.00
Misc. stand.-sec. rails.	16.50 to 17.00
Railroad springs	20.00 to 20.50
Bundled sheets	10.00 to 10.50
No. 2 RR. wrought	15.50 to 16.00
No. 1 busheling	12.00 to 12.50
Cast bor. & turn.	7.50 to 8.00
Rails for rolling	18.00 to 18.50
Machine shop turn.	9.00 to 9.50
Heavy turnings	12.00 to 12.50
Steel car axles	21.50 to 22.00
Iron car axles	22.00 to 22.25
No. 1 RR. wrought	12.00 to 12.50
Steel rails under 3 ft.	18.50 to 19.00
Steel angle bars	17.50 to 18.00
Cast iron carwheels.	17.00 to 17.50
No. 1 machinery cast.	14.00 to 14.50
Railroad malleable	18.00 to 18.50
No. 1 railroad cast.	14.00 to 14.50
Stove plate	11.00 to 11.50
Agricul. malleable	12.50 to 13.00
Grate bars	11.50 to 12.00
Brake shoes	11.50 to 12.00

CINCINNATI

Dealers' buying prices per gross ton:

No. 1 hvy. mltng. steel.	\$14.75 to \$15.25
No. 2 hvy. mltng. steel.	12.25 to 12.75
Scrap rails for mltng.	18.00 to 18.50
Loose sheet clippings.	10.75 to 11.25
Hydrau. b'ndled sheets.	14.25 to 14.75
Cast iron borings	8.50 to 9.00
Machine shop turn.	9.00 to 9.50
No. 1 busheling	13.00 to 13.50
No. 2 busheling	6.50 to 7.00
Rails for rolling	20.00 to 20.50
No. 1 locomotive tires.	16.00 to 16.50
Short rails	21.00 to 21.50
Cast iron carwheels.	15.00 to 15.50
No. 1 machinery cast.	14.50 to 15.00
No. 1 railroad cast.	14.50 to 15.00
Burnt cast.	10.00 to 10.50
Stove plate	10.00 to 10.50
Agricul. malleable	15.50 to 16.00
Railroad malleable	16.75 to 17.25
Mixed hvy. cast.	12.50 to 13.00

DETROIT

Dealers' buying prices per gross ton:

No. 1 hvy. mltng. steel.	\$15.00 to \$15.50
No. 2 hvy. mltng. steel.	14.00 to 14.50
Borings and turnings.	10.50 to 11.00
Long turnings	10.00 to 10.50
Short shov. turnings.	11.00 to 11.50
No. 1 machinery cast.	15.00 to 15.50
Automotive cast	15.50 to 16.00
Hydraul. comp. sheets.	16.50 to 17.00
Stove plate	9.50 to 10.00
New factory bushel.	14.50 to 15.00
Old No. 2 busheling.	10.00 to 10.50
No. 2 busheling (black fender stock)	12.50 to 13.00
Sheet clippings	11.25 to 11.75
Flashings	14.00 to 14.50
Low phos. plate scrap.	15.50 to 16.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	\$18.50 to \$19.00
Hydraulic bundles	18.00 to 18.50
Machine shop turn.	14.00 to 14.50

NEW YORK

Dealers' buying prices per gross ton:

No. 1 hvy. mltng. steel.	\$15.00 to \$15.50
No. 2 hvy. mltng. steel.	14.00 to 14.50
Hvy. breakable cast.	14.75 to 15.25
No. 1 machinery cast.	15.50 to 16.00
No. 2 cast.	14.50 to 15.00
Stove plate	11.50 to 12.00
Steel car axles	25.00 to 26.00
Shafting	19.50 to 20.00
No. 1 RR. wrought.	17.50 to 18.00
No. 1 wrought long.	16.50 to 17.00
Spec. iron & steel pipe.	13.00 to 13.50
Rails for rolling	19.00 to 19.50
Clean steel turnings	9.50 to 10.00
Cast borings	9.00 to 9.50
No. 1 blast furnace	9.00 to 9.50
Cast borings (chem.)	12.50 to 13.00
Unprepar. yard scrap.	9.50 to 10.00

Per gross ton, delivered local foundries:

No. 1 machn. cast.	\$17.50 to \$18.00
No. 1 hvy. cast cupola.	15.00 to 15.50
No. 2 cast	14.50 to 15.00

BOSTON

Dealers' buying prices per gross ton:

No. 1 hvy. mltng. steel.	\$13.55
Scrap rails	13.55
No. 2 steel	12.50
Breakable cast.	13.25
Machine shop turn.	8.30
Mixed bor. & turn.	8.30
Bund. skeleton long.	\$11.90 to 11.95
Shafting	18.00 to 18.25
Cast bor. chemical.	9.00 to 10.00

Per gross ton delivered consumers' yards:

Textile cast.	\$17.00 to \$18.00
No. 1 machine cast.	18.00
Stove plate	10.00 to 10.50

CANADA

Dealers' buying prices at their yards, per gross ton

Toronto Montreal	
No. 1 hvy. mltng. stl.	\$12.50 \$12.00
No. 2 hvy. mltng. stl.	11.50 11.00
Mixed dealers steel.	11.00 10.50
Scrap pipe	10.00 9.75
Steel turnings	8.00 8.00
Cast borings	9.25 9.00
Mach'nery cast.	16.00 15.50
Dealers cast.	14.00 14.00
Stove plate	12.00 11.00

EXPORT

Dealers' buying prices per gross ton:

New York, truck lots, delivered, barges.

No. 1 hvy. mltng. steel.	\$15.50
No. 2 hvy. mltng. steel.	14.50
No. 2 cast.	13.50
Stove plate	11.06

Boston on cars at Army Base or Mystic Wharf

No. 1 hvy. mltng. steel.	\$16.00
No. 2 hvy. mltng. steel.	15.00
Rails (scrap)	16.00

Philadelphia, delivered alongside boats, Port Richmond

No market at present.

New Orleans, f.a.s., Stuyvesant Dock

No. 1 hvy. mltng. steel.	\$17.50
No. 2 hvy. mltng. steel.	16.50

Los Angeles, on cars or trucks at local piers

No. 1 hvy. mltng. steel.	\$10.50 to \$11.00
Compressed bundles	8.50 to 9.00

PRICES ON FINISHED AND SEMI-FINISHED IRON AND STEEL

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham. Prices at Duluth are \$2 a ton higher, and delivered Detroit \$3 higher.

Per Gross Ton

Rerolling\$37.00
Forging quality 43.00

Sheet Bars

F.o.b. Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

Per Gross Ton

Open-hearth or Bessemer\$37.00

Skelp

F.o.b. Pittsburgh, Chicago, Youngstown, Buffalo, Coatesville, Pa., Sparrows Point, Md.

Per Lb.

Grooved, universal and sheared2.10c.

Wire Rods

(No. 5 to 9/32 in.)

Per Gross Ton

F.o.b. Pittsburgh or Cleveland.....\$47.00
F.o.b. Chicago, Youngstown or Anderson, Ind. 48.00
F.o.b. Worcester, Mass. 49.00
F.o.b. Birmingham 50.00
F.o.b. San Francisco..... 56.00
F.o.b. Galveston 53.00
Rods over 9/32 in. to 47/64 in., inclusive, \$5 a ton over base.

BARS, PLATES, SHAPES

Iron and Steel Bars

Soft Steel

Base per Lb.

F.o.b. Pittsburgh 2.45c.
F.o.b. Chicago or Gary 2.50c.
F.o.b. Duluth 2.60c.
Del'd Detroit 2.60c.
F.o.b. Cleveland 2.50c.
F.o.b. Buffalo 2.55c.
Del'd Philadelphia 2.74c.
Del'd New York 2.78c.
F.o.b. Birmingham 2.60c.
F.o.b. cars dock Gulf ports... 2.85c.
F.o.b. cars dock Pacific ports... 3.00c.

Rail Steel

(For merchant trade)

F.o.b. Pittsburgh 2.30c.
F.o.b. Cleveland, Chicago, Gary or Moline, Ill. 2.35c.
F.o.b. Buffalo 2.40c.
F.o.b. Birmingham 2.45c.
F.o.b. cars dock Gulf ports... 2.70c.
F.o.b. cars dock Pacific ports... 2.85c.

Billet Steel Reinforcing

(Straight lengths as quoted by distributors)

F.o.b. Pittsburgh 2.55c.
F.o.b. Buffalo, Cleveland, Youngstown, Chicago, Gary or Birmingham 2.60c.
Del'd Detroit 2.70c.
F.o.b. cars dock Gulf ports... 2.95c.
F.o.b. cars dock Pacific ports... 2.95c.

Rail Steel Reinforcing

(Straight lengths as quoted by distributors)

F.o.b. Pittsburgh 2.40c.
F.o.b. Buffalo, Cleveland, Youngstown, Chicago, Gary or Birmingham 2.45c.
F.o.b. cars dock Gulf ports... 2.80c.
F.o.b. cars dock Pacific ports... 2.80c.

Iron

F.o.b. Chicago 2.40c.
F.o.b. Pittsburgh (refined) 3.60c.

Cold Finished Bars and Shafting*

Base per Lb.

F.o.b. Pittsburgh 2.90c.
F.o.b. Cleveland, Chicago and Gary 2.95c.
F.o.b. Buffalo 3.00c.
F.o.b. Detroit 2.95c.

* In quantities of 10,000 to 19,999 lb.

Plates

Base per Lb.

F.o.b. Pittsburgh 2.25c.
F.o.b. Chicago or Gary 2.30c.
Del'd Cleveland 2.435c.
F.o.b. Coatesville or Spar. Pt. . 2.35c.
Del'd Philadelphia 2.435c.
Del'd New York 2.53c.
F.o.b. Birmingham 2.40c.

F.o.b. cars dock Gulf ports... 2.65c.
F.o.b. cars dock Pacific ports... 2.80c.
Wrought iron plates, f.o.b. Pittsburgh 3.80c.

Floor Plates

F.o.b. Pittsburgh 3.80c.
F.o.b. Chicago 3.85c.
F.o.b. Coatesville 3.90c.
F.o.b. cars dock Gulf ports... 4.20c.
F.o.b. cars dock Pacific ports... 4.35c.

Structural Shapes

Base per Lb.

F.o.b. Pittsburgh 2.25c.
F.o.b. Chicago 2.30c.
Del'd Cleveland 2.435c.
F.o.b. Buffalo or Bethlehem... 2.35c.
Del'd Philadelphia 2.455c.
Del'd New York 2.5025c.
F.o.b. Birmingham (standard) 2.40c.
F.o.b. cars dock Gulf ports... 2.65c.
F.o.b. cars dock Pacific ports... 2.80c.

Steel Sheet Piling

Base per Lb.

F.o.b. Pittsburgh 2.60c.
F.o.b. Chicago or Buffalo 2.70c.
F.o.b. cars dock Gulf or Pacific Coast ports 3.05c.

RAILS AND TRACK SUPPLIES

F.o.b. Mill

Standard rails, heavier than 60 lb., per gross ton\$42.50
Angle bars, per 100 lb. 2.80

F.o.b. Basing Points

Light rails (from billets) per gross ton\$43.00
Light rails (from rail steel) per gross ton 42.00

Base per Lb.

Spikes 3.15c.
Tie plates, steel 2.30c.
Tie plates, Pacific Coast ports... 2.40c.
Track bolts, to steam railroads. 4.35c.
Track bolts, to jobbers, all sizes (per 100 counts)

65-5 per cent off list
Basing points on light rails are Pittsburgh, Chicago and Birmingham; on spikes and tie plates, Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minneapolis, Colo., Birmingham and Pacific Coast ports; on the plates alone, Steelton, Pa.; Buffalo; on spikes alone, Youngstown, Lebanon, Pa., Richmond, Va.

SHEETS, STRIP, TIN PLATE

TERNE PLATE

Sheets

Hot Rolled

Base per Lb.

No. 10, f.o.b. Pittsburgh 2.40c.
No. 10, f.o.b. Gary 2.50c.
No. 10, del'd Detroit 2.60c.
No. 10, del'd Philadelphia 2.69c.
No. 10, f.o.b. Granite City 2.60c.
No. 10, f.o.b. Birmingham 2.55c.
No. 10, f.o.b. cars dock Pacific ports 2.95c.
No. 10 wrought iron, Pgh. 4.25c.

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh 3.15c.
No. 24, f.o.b. Gary 3.25c.
No. 24, del'd Detroit 3.35c.
No. 24, del'd Philadelphia 3.44c.
No. 24, f.o.b. Granite City 3.35c.
No. 24, f.o.b. Birmingham 3.30c.
No. 24, f.o.b. cars dock Pacific ports 3.80c.
No. 24 wrought iron, Pittsburgh 5.15c.

Heavy Cold-Rolled

No. 10 gage, f.o.b. Pittsburgh. 3.10c.
No. 10 gage, f.o.b. Gary 3.20c.
No. 10 gage, f.o.b. Detroit 3.30c.
No. 10 gage, del'd Philadelphia. 3.39c.
No. 10, f.o.b. Granite City 3.30c.
No. 10 gage, f.o.b. Birmingham. 3.25c.
No. 10 gage, f.o.b. cars dock Pacific ports 3.70c.

Light Cold-Rolled

No. 20 gage, f.o.b. Pittsburgh.. 3.55c.
No. 20 gage, f.o.b. Gary 3.65c.
No. 20 gage, del'd Detroit 3.75c.
No. 20 gage, del'd Philadelphia. 3.84c.
No. 20, f.o.b. Granite City 3.75c.
No. 20 gage, f.o.b. Birmingham. 3.70c.
No. 20 gage, f.o.b. cars, dock, Pacific ports 4.10c.

Galvanized Sheets

No. 24 gage, f.o.b. Pittsburgh. 3.80c.
No. 24, f.o.b. Gary 3.90c.
No. 24, del'd Philadelphia..... 4.09c.
No. 24, f.o.b. Granite City 4.00c.

No. 24, f.o.b. Birmingham3.95c.
No. 24, f.o.b. cars, dock, Pacific ports4.40c.
No. 24, wrought iron, Pittsburgh 6.10c.

Electrical Sheets

(F.o.b. Pittsburgh)

Base per Lb.

Field grade3.35c.
Armature3.70c.
Electrical4.20c.
Special Motor5.10c.
Special Dynamo5.80c.
Transformer6.30c.
Transformer Special7.30c.
Transformer Extra Special7.80c.

Base gage changed from 28 to 24 gage. Gage extras are the same as those applying on hot-rolled, annealed sheets with few exceptions.
Silicon Strip in coils—Sheet price plus silicon sheet extra width extras plus 25c. per 100 lb. for coils.

Long Ternes

No. 24, unassorted 8-lb. coating f.o.b. Pittsburgh4.10c.
F.o.b. Gary4.20c.
F.o.b. cars, dock, Pacific ports 4.80c.

Vitreous Enameling Stock

No. 20, f.o.b. Pittsburgh3.50c.
No. 20, f.o.b. Gary3.60c.
No. 20, f.o.b. Granite City3.70c.
No. 20, f.o.b. cars dock Pacific ports4.10c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh, per lb.3.30c.
No. 28, Gary3.40c.
No. 28, f.o.b. Granite City.....3.50c.
No. 28, cars dock Pacific ports, boxed4.175c.

Tin Plate

Base per Box

Standard cokes, f.o.b. Pittsburgh district mill\$5.35
Standard cokes, f.o.b. Gary.... 5.45
Standard coke, f.o.b. Granite City 5.55

Above quotations practically the equivalent of previous quotations owing to new method of quoting, effective Jan. 1, 1937.

Special Coated Manufacturing Ternes

Base per Box

F.o.b. Pittsburgh*\$4.65
F.o.b. Gary* 4.75
F.o.b. Granite City 4.85

* Customary 7½ per cent discount in effect through 1936 discontinued as of Jan. 1, 1937.

Terne Plate

(F.o.b. Pittsburgh)

(Per Package, 112 sheets, 20 x 28 in.)
8-lb. coating I.C.\$11.00
15-lb. coating I.C. 13.00
20-lb. coating I.C. 14.00
25-lb. coating I.C. 15.00
30-lb. coating I.C. 16.25
40-lb. coating I.C. 18.50

Hot-Holled Hoops, Bands, Strip and Flats under ¼ in.

Base per Lb.

All widths up to 24 in., Pittsburgh2.40c.
All widths up to 24 in., Chicago 2.50c.
All widths up to 24 in., del'd Detroit2.60c.
All widths up to 24 in., Granite City2.60c.
All widths up to 24 in., Birmingham2.55c.
Cooperage stock, Pittsburgh... 2.50c.
Cooperage stock, Chicago 2.60c.

Cold-Rolled Strip*

Base per Lb.

F.o.b. Pittsburgh3.20c.
F.o.b. Cleveland3.20c.
Del'd Chicago3.48c.
F.o.b. Worcester3.40c.

* Carbon 0.25 and less.

Cold Rolled Spring Steel

Pittsburgh

and

Cleveland Worcester

Carbon 0.25-0.50% 3.20c. 3.40c.
Carbon .51-.75 4.45c. 4.65c.
Carbon .76-1.00 6.30c. 6.50c.
Carbon Over 1.00 8.50c. 8.70c.

Fender Stock

No. 14, Pittsburgh or Cleveland 3.45c.
No. 20, Pittsburgh or Cleveland. 3.85c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland)

To Manufacturing Trade

Per Lb.
Bright wire 2.90c.
Spring wire 3.50c.
Chicago prices on products sold to the manufacturing trade are \$1 a ton above Pittsburgh or Cleveland. Worcester and Duluth prices are \$2 a ton above, Birmingham \$3 above, and Pacific Coast prices \$9 a ton above Pittsburgh or Cleveland.

To the Trade

Base per Keg
Standard wire nails \$2.75
Smooth coated nails \$2.75
Cut nails, carloads \$3.60

Base per 100 Lb.
Annealed fence wire \$3.20
Galvanized fence wire 3.60
Polished staples 3.45
Galvanized staples 3.70
Barbed wire, galvanized 3.40
Twisted barbless wire 3.40
Woven wire fence, base column. 74
Single loop bale ties, base col.... 63

Chicago and Anderson, Ind., mill prices are \$1 a ton over Pittsburgh base (on all products except woven wire fence, for which the Chicago price is \$2 above Pittsburgh); Duluth, Minn., mill prices are \$2 a ton over Pittsburgh, except for woven wire fence, which is \$3 over Pittsburgh and Birmingham mill prices are \$3 a ton over Pittsburgh.

On wire nails, barbed wire and staples, prices at Houston, Galveston and Corpus Christi, Tex., New Orleans, Lake Charles, La., and Mobile, Ala., are \$6 a ton over Pittsburgh.

On nails, staples and barbed wire, prices of \$6 a ton above Pittsburgh are also quoted at Beaumont and Orange, Tex.

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh
District and Lorain, Ohio, Mills
F.o.b. Pittsburgh only on wrought iron pipe.

Steel		Wrought Iron	
In.	Black Galv.	In.	Black Galv.
1/8	52 31	1/8	52 31
1/4	55 38 1/2	1/4	55 38 1/2
3/8	59 49	3/8	59 49
1/2	62 53	1/2	62 53
3/4	64 55 1/2	3/4	64 55 1/2
1 to 3	64 55 1/2	1 to 3	64 55 1/2
2	57 47 1/2	2	57 47 1/2
2 1/2	60 50 1/2	2 1/2	60 50 1/2
3 1/2	62 52 1/2	3 1/2	62 52 1/2
7 & 8	61 50 1/2	7 & 8	61 50 1/2
9 & 10	60 50 1/2	9 & 10	60 50 1/2
11 & 12	59 49	11 & 12	59 49

Butt Weld, extra strong, plain ends		Lap Weld, extra strong, plain ends	
In.	Black Galv.	In.	Black Galv.
1/8	50 36 1/2	1/8	50 36 1/2
1/4	52 38 1/2	1/4	52 38 1/2
3/8	57 48 1/2	3/8	57 48 1/2
1/2	61 52 1/2	1/2	61 52 1/2
3/4	63 55	3/4	63 55
1 to 3	63 55	1 to 3	63 55

Lap Weld, extra strong, plain ends		Butt Weld, extra strong, plain ends	
In.	Black Galv.	In.	Black Galv.
2	55 46 1/2	2	55 46 1/2
2 1/2	59 50 1/2	2 1/2	59 50 1/2
3 1/2	62 54	3 1/2	62 54
7 & 8	61 51	7 & 8	61 51
9 & 10	60 50	9 & 10	60 50
11 & 12	59 49	11 & 12	59 49

On butt-weld and lap-weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30¢ and the carload freight rate to the base card.

Note—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2 1/2 points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Seamless Steel Commercial Boiler Tubes and Locomotive Tubes

(Net base prices per 100 ft. f.o.b. Pittsburgh in carload lots)

	Cold Drawn	Hot Rolled
1 in. o.d.	13 B.W.G. \$ 9.46	\$ 8.41
1 1/4 in. o.d.	13 B.W.G. 11.21	9.96
1 1/2 in. o.d.	13 B.W.G. 12.38	11.00
2 in. o.d.	13 B.W.G. 14.09	12.51
2 1/4 in. o.d.	13 B.W.G. 15.78	14.02
2 1/2 in. o.d.	13 B.W.G. 17.60	15.63
2 3/4 in. o.d.	12 B.W.G. 19.37	17.21
3 in. o.d.	12 B.W.G. 21.22	18.85
3 1/4 in. o.d.	12 B.W.G. 22.49	19.98
3 1/2 in. o.d.	12 B.W.G. 23.60	20.97
3 3/4 in. o.d.	10 B.W.G. 45.19	40.15
4 in. o.d.	11 B.W.G. 29.79	26.47
4 1/4 in. o.d.	10 B.W.G. 36.96	32.83
5 in. o.d.	9 B.W.G. 56.71	50.38
6 in. o.d.	7 B.W.G. 87.07	77.35

Extra for less-carload quantities:
25,000 lb. or ft. to 39,999 lb. or ft. 5 %
12,000 lb. or ft. to 24,999 lb. or ft. 12 1/2 %
6,000 lb. or ft. to 11,999 lb. or ft. 25 %
2,000 lb. or ft. to 5,999 lb. or ft. 35 %
Under 2,000 lb. or ft. 50 %

CAST IRON WATER PIPE

Per Net Ton
*6-in. and larger, del'd Chicago. \$55.00
6-in. and larger, del'd New York 53.00
*6-in. and larger, Birmingham. 47.00
6-in. and larger, f.o.b. dock, San Francisco or Los Angeles. 56.00
F.o.b. dock, Seattle. 56.00
4-in., f.o.b. dock, San Francisco or Los Angeles. 59.00
F.o.b. dock, Seattle. 59.00

Class "A" and gas pipe, \$3 extra.
4-in. pipe is \$3 a ton above 6-in.

Prices for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is \$46, Birmingham, and \$54 delivered Chicago; and 4-in. pipe, \$49, Birmingham, and \$58 delivered Chicago.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Per Cent Off List
Machine and carriage bolts:
1/2 in. x 6 in. and smaller. 65 and 5*
Larger and longer up to
1 in. 60 and 10*
1 1/2 in. and larger. 60 and 5*
Lag bolts, Nos. 1, 2, 3
and 7 65 and 5
Hot pressed nuts, and c.p.c.
and t nuts, square or hex.
blank or tapped:
1/2 in. and smaller. 65
3/16 in. to 1 in. inclusive. 60 and 5
1 1/2 in. and larger 60

Jobbers discount on above items, 5 per cent.

* Less carload lots and less than full container quantity. Less carload lots in full container quantity, an additional 10 per cent discount; carload lots and full container quantity, still another 5 per cent discount.

Semi-finished hexagon nuts, U.S.S. and S.A.E.:

1/2 in. and smaller 60 and 10
3/16 in. to 1 in. inclusive. 60 and 5
1 1/2 in. and larger 60
Stove bolts in packages, nuts attached 72 1/2
Stove bolts in packages, with nuts separate 72 1/2 and 5
Stove bolts in bulk 80

On stove bolts freight is allowed to destination on 200 lb. and over.

Large Rivets

(1/2-in. and larger)

Base per 100 Lbs.
F.o.b. Pittsburgh or Cleveland. \$3.60
F.o.b. Chicago or Birmingham. 3.70

Small Rivets

(7/16-in. and smaller)

Per Cent Off List
F.o.b. Pittsburgh 65 and 5
F.o.b. Cleveland 65 and 5
F.o.b. Chicago and Birmingham 65 and 5

Cap and Set Screws

(Freight allowed up to but not exceeding 65c. per 100 lb. on lots of 200 lb. or more)

Per Cent Off List
Milled cap screws, 1 in. dia. and smaller 50 and 10
Milled standard set screws, case hardened, 1 in. dia. and smaller 75
Milled headless set screws, cut thread 1/4 in. and smaller 75
Upset hex. head cap screws U.S.S. or S.A.E. thread, 1 in. and smaller 60
Upset set screws, cup and oval points 75
Milled studs 65

Alloy and Stainless Steel

Alloy Steel Blooms, Billets and Slabs
F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem.
Base price, \$60 a gross ton.

Alloy Steel Bars

F.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.
Open-hearth grade, base 3.00c.
Delivered, Detroit 3.15c.
S.A.E. Alloy Differential Numbers per 100 lb.
200 (1/2% Nickel) \$0.35
2100 (1 1/2% Nickel) 0.75
2300 (3 1/2% Nickel) 1.55

2500 (5% Nickel) \$2.25
3100 Nickel-chromium 0.70
3200 Nickel-chromium 1.35
3300 Nickel-chromium 3.80
3400 Nickel-chromium 3.20
4100 Chromium-molybdenum (0.15 to 0.25 Molybdenum). 0.55
4100 Chromium-molybdenum (0.25 to 0.40 Molybdenum). 0.75
4600 Nickel-molybdenum (0.20 to 0.30 Mo, 1.50 to 2.00 Ni.) 1.10
5100 Chrome steel (0.60-0.90 Cr.) 0.35
5100 Chrome steel (0.80-1.10 Cr.) 0.45
5100 Chromium spring steel. 0.15
6100 Chromium-vanadium bar. 1.20
6100 Chromium-vanadium spring steel 0.85
Chromium-nickel-vanadium ... 1.50
Carbon-vanadium 0.85

These prices are for hot-rolled steel bars. The differential for most grades in electric furnace steel is 50c. higher. Slabs with a section area of 16 in. and 2 1/2 in. thick or over take the billet base.

Alloy Cold-Finished Bars

F.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 3.60c. base per lb. Delivered Detroit, 3.75c., carlots.

CORROSION & HEAT RESISTANT ALLOYS

(Base prices, cents per lb., f.o.b. Pittsburgh)

Chrome-Nickel		No. 304	No. 302
Forging billets	21.25c.	20.40c.	
Bars	25c.	24c.	
Plates	29c.	27c.	
Structural shapes	25c.	24c.	
Sheets	36c.	34c.	
Hot-rolled strip	23.50c.	21.50c.	
Cold-rolled strip	30c.	28c.	
Drawn wire	25c.	24c.	

Straight Chrome

	No. 410	No. 430	No. 442	No. 446
Bars	18.50c.	19c.	22.50c.	27.50c.
Plates	21.50c.	22c.	25.50c.	30.50c.
Sheets	26.50c.	29c.	32.50c.	36.50c.
Hot strip	17c.	17.50c.	23c.	28c.
Cold stp.	22c.	22.50c.	28.50c.	36.50c.

TOOL STEEL

High speed 67c
High-carbon-chrome 43c
Oil-hardening 24c
Special 22c
Extra 18c
Regular 14c

Prices for warehouse distribution to all points on or East of Mississippi River are 2c. a lb. higher. West of Mississippi quotations are 3c a lb. higher.

British and Continental

BRITISH

Per Gross Ton
f.o.b. United Kingdom Ports

Ferromanganese, ex-port £20 Nominal
Tin plate, per base box 25s. to 25s. 6d.
Steel bars, open-hearth. £11
Beams, open-hearth. £10 12s. 6d.
Channels, open-hearth. £10 12s. 6d.
Angles, open-hearth £10 12s. 6d.
Black sheets, No. 24 gage £15
Galvanized sheets, No. 24 gage £18 15s.

CONTINENTAL

Per Metric Ton, Gold £.
f.o.b. Continental Ports

Current dollar equivalent is ascertained by multiplying gold pound prices by 124.14 to obtain franc equivalent and then converting at present rate of dollar-franc exchange.
Billets, Thomas £4 7s. 6d.
Wire rods, No. 5 B.W.G. £5 2s. 6d.
Steel bars, merchant £5
Sheet bars £4 8s. 6d.
Plate 1/4 in. and up. £6 7s.
Plate 3/16 in. and 5 mm. £6 13s.
Sheet, 1/4 in. £7 9s. 6d.
Beams, Thomas £4 18s.
Angles (Basic) £4 18s.
Hoops and strip, base £6

IRON AND STEEL WAREHOUSE PRICES

PITTSBURGH*

	Per Net Ton
Plates	3.70c.
Structural shapes	3.70c.
Soft steel bars and small shapes	3.80c.
Reinforcing steel bars	3.80c.
Cold-finished and screw stock:	
Rounds and hexagons	4.15c.
Squares and flats	4.15c.
Hot rolled strip incl. 3/16 in. thick, under 24 in. wide.	4.00c.
Hoops	4.50c.
Hot-rolled annealed sheets (No. 24), 10 or more bundles	4.50c.
Galv. sheets (No. 24), 10 or more bundles	5.15c.
Hot-rolled sheets (No. 10)	3.75c.
Galv. corrug. sheets (No. 28), per square (more than 3750 lb.)	\$4.48
Spikes, large	1 to 24 kegs 3.90c.
Per Cent Off List	
Track bolts, all sizes, per 100 count	55
Machine bolts, 100 count	**
Carriage bolts, 100 count	**
Nuts, all styles, 100 count	**
Large rivets, base per 100 lb.	\$4.35
Wire, black, soft ann'd, base per 100 lb.	3.45c.
Wire, galv. soft, base per 100 lb.	3.85c.
Common wire nails, per keg	3.00c.
Cement coated nails, per keg	3.00c.

On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applies to orders of 400 to 9999 lb.

*Delivered in Pittsburgh switching district.

**Prices on application.

CHICAGO Base per Lb.

Plates and structural shapes	3.75c.
Soft steel bars, rounds	3.85c.
Soft steel bars, squares and hexagons	4.00c.
Cold-fin. steel bars:	
Rounds and hexagons	4.30c.
Flats and squares	4.30c.
Hot-rolled strip	4.10c.
Hot-rolled annealed sheets (No. 24)	4.60c.
Galv. sheets (No. 24)	5.25c.
Spikes (keg lots)	4.40c.
Track bolts (keg lots)	5.60c.
Rivets, structural (keg lots)	4.60c.
Rivets, boiler (keg lots)	4.70c.

Per Cent Off List

Machine bolts	*60
Carriage bolts	*60
Lag screws	*55 and 5
Hot-pressed nuts, sq. tap or blank	*60
Hot-pressed nuts, hex. tap or blank	*60
Hex. head cap screws	60
Cut point set screws	75
Flat head bright wood screws	62 and 20
Spring cotters	45
Stove bolts in full packages	72 1/2
Rd. hd. tank rivets, 7/16 in. and smaller	55
Wrought washers	\$4.00 off list
Black ann'd wire per 100 lb. to mfg. trade (No. 14 and heavier)	\$4.55
Com. wire nails, 15 kegs or more, per keg	\$3.20
Cement c'd nails, 15 kegs or more, per keg	\$3.20

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets, the base applies on orders of 400 to 3999 lb. All prices are f.o.b. consumers' plants within the Chicago switching district.

*These are quotations delivered to city trade for quantities of 100 lb. or more. For lots of less than 100 lb., the quotation is 60 per cent off. Discounts applying to country trade are 70 per cent off, f.o.b. Chicago, with full or partial freight allowed up to 50c. per 100 lb.

NEW YORK

Base per Lb.

Plates, 1/4 in. and heavier	4.00c.
Structural shapes	3.97c.
Soft steel bars, round	4.12c.
Iron bars, Swed. charcoal	7.00 to 7.25c.
Cold-fin. shafting and screw stock:	
Rounds and hexagons	4.57c.
Flats and squares	4.57c.
Cold-rolled: strip, soft and quarter hard	3.92c.
Hoops	4.32c.

Bands	4.32c.
Hot-rolled sheets (No. 10)	4.00 to 4.07c.
Hot-rolled ann'd sheets (No. 24*)	4.50 to 4.82c.
Galvanized sheets (No. 24*)	5.47c.
Long terme sheets (No. 24)	5.50 to 6.20c.
Armco iron, galv. (No. 24†)	6.25c.
Toncan iron, galv. (No. 24†)	6.25c.
Galvanneal (No. 24†)	6.60c.
Armco iron, hot-rolled annealed (No. 24†)	5.65c.
Toncan iron, hot-rolled annealed (No. 24†)	5.65c.
Armco iron hot-rolled (No. 10†)	4.60c.
Toncan iron, hot-rolled (No. 10†)	4.60c.
Cold-rolled sheets (No. 20) for quantities 400 to 1499 lb.	
Standard quality	5.40c.
Deep drawing	6.05c.
Stretch leveled	6.05c.
SAE, 2300, hot-rolled	7.82c.
SAE, 3100, hot-rolled	6.37c.
SAE, 6100, hot-rolled, annealed	10.52c.
SAE, 2300, cold-rolled	9.00c.
SAE, 3100, cold-rolled, annealed	8.55c.
Floor plate, 1/4 in. and heavier	5.90c.
Standard tool steel	12.50c.
Wire, black, annealed (No. 9)	4.25c.
Wire, galv. (No. 9)	4.60c.
Tire steel, 1 x 1/2 in. and larger	4.61c.
Open-hearth spring steel	4.75c. to 10.25c.
Common wire nails, base per keg	3.25c.

Per Cent Off List

Machine bolts, square head and nut:	
All diameters. Prices on application	
Carriage bolts, cut thread:	
All diameters. Prices on application	

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.
†125 lb. and more.

ST. LOUIS Base per Lb.

Plates and struc. shapes	3.99c.
Bars, soft steel (rounds and flats)	4.09c.
Bars, soft steel (squares, hexagons, ovals, half ovals and half rounds)	4.24c.
Cold-fin. rounds, shafting, screw stock	4.54c.
Hot-rolled annealed sheets (No. 24)	4.84c.
Galv. sheets (No. 24*)	5.49c.
Hot-rolled sheets (No. 10)	4.09c.
Black corrug. sheets (No. 24*)	4.89c.
2 galv. corrug. sheets	5.54c.
Structural rivets	4.94c.
Boiler rivets	5.04c.

Per Cent Off List

Tank rivets, 7/16 in. and smaller	55
Machine and carriage bolts, lag screws, fitting up bolts, bolt ends, plow bolts, hot-pressed nuts, square and hexagon, tapped or blank, semi-finished nuts; all quantities	65

*No. 26 and lighter take special prices.

PHILADELPHIA

Base Per Lb.

*Plates, 1/4-in. and heavier	3.80c.
*Structural shapes	3.30c.
*Soft steel bars, small shapes, iron bars (except bands)	3.90c.
†Reinforc. steel bars, sq. twisted and deformed	3.43c.
Cold-finished steel bars	4.53c.
*Steel hoops	4.25c.
*Steel bands, No. 12 and 3/16 in. incl.	4.00c.
Spring steel	5.40c.
†Hot-rolled anneal. sheets (No. 24)	4.65c.
†Galvanized sheets (No. 24)	5.30c.
*Hot-rolled annealed sheets (No. 10)	3.90c.
Diam. pat. floor plates, 1/4 in.	5.45c.

These prices are subject to quantity differential except on reinforcing and Swedish iron bars.

*Base prices subject to deduction on orders aggregating 4000 lb. or over.

†For 25 bundles or over.

†For less than 2000 lb.

CLEVELAND

Base per Lb.

Plates and struc. shapes	3.86c.
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Soft steel bars	3.75c.
†Reinforc. steel bars	2.60c.
†Cold-finished steel bars	4.30c.
Hot-rolled strip, 6 in. wide and under	4.16c.
Cold-finished strip	3.60c.
Hot-rolled annealed sheets (No. 24)	4.66c.
Galvanized sheets (No. 24)	5.31c.
Hot-rolled sheets (No. 10)	3.91c.
Hot-rolled 3/16 in. 24 to 48 in. wide sheets	3.91c.
Floor plates, 3/16 in. and heavier	5.76c.
*Black ann'd wire, per 100 lb.	\$3.40
*No. 9 galv. wire, per 100 lb.	3.80
*Com. wire nails, base per keg	2.95

Per Cent Off List

Machine and carriage bolts, small	65 and 5
Large	60 and 10
Nuts, 100 count	
1/2 in. and smaller	65 and 5
9/16 in. to 1 in.	60 and 10

†Outside delivery 10c. less.

*For 5000 lb. or less.

†Plus switching and cartage charges and quantity differentials up to 50c.

CINCINNATI Base per Lb.

Plates and struc. shapes	3.95c.
Floor plates	5.85c.
Bars, rounds, flats and angles	4.05c.
Other shapes	4.20c.
Rail steel reforc. bars	3.75c.
Hoops and bands, 3/16 in. and lighter	4.25c.
Cold-finished bars	4.50c.
Hot-rolled annealed sheets (No. 24) 3500 lb. or more	4.60c.
Galv. sheets (No. 24) 3500 lb. or more	\$5.25
Hot-rolled sheets (No. 10)	4.00c.
Small rivets	55 per cent off list
No. 9 ann'd wire, per 100 lb. (1000 lb. or over)	\$2.88
Com. wire nails, base per keg:	
Any quantity less than carload	3.04
Cement c'd nails, base 100-lb. keg	3.50
Chain, lin. per 100 lb.	8.35

Net per 100 Ft.

Seamless steel boiler tubes,	
2-in.	\$21.80
4-in.	52.45
Lap-welded steel boiler tubes,	
2-in.	20.73
4-in.	48.41

BUFFALO Base per Lb.

Plates	3.92c.
Struc. shapes	3.80c.
Soft steel bars	3.90c.
Reinforcing bars	3.10c.
Cold-fin. flats and sq.	4.35c.
Rounds and hex.	4.35c.
Cold-rolled strip steel	3.79c.
Hot-rolled annealed sheets (No. 24)	4.80c.
Heavy hot-rolled sheets (3/16 in., 24 to 48 in. wide)	3.97c.
Galv. sheet (No. 24)	5.45c.
Bands	4.22c.
Hoops	4.22c.
Heavy hot-rolled sheets	3.97c.
Com. wire nails, base per keg	\$3.26
Black wire, base per 100 lb. (2500-lb lots or under)	4.55c.
(Over 2500 lb.)	4.45c.

BOSTON Base per Lb.

Channels, angles	4.20c.
Tees and zeels, under 3"	4.45c.
H beams and shapes	4.07c.
Plates — Sheared, tank and univ. mill, 1/4 thick and heavier	4.08c.
Floor plates, diamond pattern	6.03c.
Bar and bar shapes (mild steel)	4.20c.
Bands 3/16 in. thick and No. 12 ga. incl.	4.40 to 5.40
Half rounds, half ovals, ovals and bevels	5.45c.
Tire steel	5.45c.
Cold-rolled strip steel	3.845c.
Cold-finished rounds, squares and hexagons	4.65c.
Cold-finished flats	4.65c.
Blue annealed sheets, No. 10 ga.	3.90c.
One pass cold-rolled sheets No. 24 ga.	4.50c.
Galvanized steel sheets, No. 24 ga.	5.05c.
Lead coated sheets, No. 24 ga.	6.15c.

Price delivered by truck in metropolitan Boston, subject to quantity differentials.

DETROIT

Base per Lb.

Soft steel bars	3.94c.
Structural shapes	3.95c.
Plates	3.95c.
Floor plates	5.85c.
Hot-rolled annealed sheets	
(No. 24)*	4.69c.
Hot-rolled sheets (No. 10)	3.94c.
Galvanized sheets (No. 24)*	5.40c.
Bands and hoops	4.19c.
Cold-finished bars	4.30c.
Cold-rolled strip	3.78c.
Hot-rolled alloy steel (S.A.E. 3100 Series)	6.44c.
Quantity differential on bars, plates, structural shapes, bands, hoops, floor plates and heavy hot-rolled: Under 100 lb., 1.50c. over base; 100 to 399 lb., base plus .50c.; 400 to 3999 lb. base; 4000 to 9999 lb., base less .10c.; 10,000 lb. and over, less .15c.	

* Under 400 lb., .50c. over base; 400 to 1499 lb., base; 1500 to 3499 lb., base less .10c.; 3500 lb. and over, base less .15c.

Prices delivered by truck in metropolitan Detroit, subject to quantity differentials covering shipment at one time.

Galvanized and hot-rolled annealed may not be combined to obtain quantity deductions.

MILWAUKEE

Base per Lb.

Plates and structural shapes..	3.86c.
Soft steel bars, rounds up to 8 in., flats and fillet angles...	3.96c.
Soft steel bars, squares and hexagons	4.11c.
Hot-rolled strip	4.21c.
Hot-rolled annealed sheets (No. 24)	4.71c.
Galvanized sheets (No. 24)	5.36c.
Cold-finished steel bars	4.41c.
Structural rivets (keg lots)	5.16c.
Boiler rivets, cone head (keg lots)	5.26c.
Track spikes (keg lots)	4.61c.
Track bolts (keg lots)	5.81c.
Black annealed wire (No. 6 to No. 9 incl.)	4.05c.
Com. wire nails and cement coated nails	
1 to 14 kegs	3.25c.

Per Cent Off List

Machine bolts and carriage bolts, 1/2x6 and smaller or shorter...	65
Larger and longer up to 1 in., diam.	60-5
1 1/2 in. and larger	60
Coach and lag screws	60-5
Hot-pressed nuts, sq. and hex. tapped or blank, 1-199 lb.	50
200 lb. and over:	
1/2 in. and smaller	65
9/16 to 1 in.	60-5
1 1/2 in. and over	50-10-5

Prices given above are delivered Milwaukee.

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets, the base applies on orders of 400 to 3999 lb. On galvanized and No. 24 hot-rolled annealed sheets the prices given apply on orders of 400 to 1500 lb. On cold-finished bars the prices are for orders of 1000 lb. or more of a size.

ST. PAUL

Base per Lb.

Mild steel bars, rounds	4.10c.
Structural shapes	4.00c.
Plates	4.00c.
Cold-finished bars	4.55c.
Hot-rolled annealed sheets, No. 24	4.85c.
Galvanized sheets, No. 24	5.50c.

On mild steel bars, shapes and plates the base applies on 400 to 14,999 lb. On hot-rolled sheets, galvanized sheets and cold-rolled sheets base applies on 15,000 lb. and over. Base on cold-finished bars is 1000 lb. and over of a size.

BALTIMORE

Base per Lb.

Mild steel bars and small shapes	4.00c.
Structural shapes	3.90c.
Reinforcing bars, 5 to 15 tons.	3.16c.
Plates	3.90c.
Hot-rolled sheets, No. 10	3.95c.
Bands	4.20c.
Hoops	4.45c.
Special threading steel	4.15c.
Checkered floor plates 1/4 in. and heavier	5.80c.
Galvanized sheets, No. 24, 100 bds. or more	\$4.70
Cold-rolled rounds, hexagons, squares and flats, 1000 lb. and more	\$4.50

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets the base applies on orders 400 to 3999 lb.

All prices are f.o.b. consumers' plants.

For second zone add 10c. per 100 lb. for trucking.

CHATTANOOGA

Base per Lb.

Mild steel bars	4.21c.
Iron bars	4.21c.
Reinforcing bars	4.21c.
Structural shapes	4.11c.
Plates	4.11c.
Hot-rolled sheets No. 10	4.16c.
Hot-rolled annealed sheets, No. 24*	4.06c.
Galvanized sheets No. 24*	4.76c.
Steel bands	4.41c.
Cold-finished bars	4.86c.

* Plus mill item extra.

MEMPHIS

Base per Lb.

Mild steel bars	4.31c.
Shapes, bar size	4.31c.
Iron bars	4.31c.
Structural shapes	4.21c.
Plates	4.21c.
Hot-rolled sheets, No. 10	4.26c.
Hot-rolled annealed sheets, No. 24	4.91c.
Galvanized sheets, No. 24	5.66c.
Steel bands	4.56c.
Cold-drawn rounds	4.80c.
Cold-drawn flats, squares, hexagons	6.80c.
Structural rivets	5.15c.
Bolts and nuts, per cent off list	55
Small rivets, per cent off list	55

NEW ORLEANS

Base per Lb.

Mild steel bars	4.20c.
Reinforcing bars	3.24c.
Structural shapes	4.10c.
Plates	4.10c.
Hot-rolled sheets, No. 10	4.35c.
Steel bands	4.75c.
Cold-finished steel bars	5.10c.
Structural rivets	4.85c.
Boiler rivets	4.85c.
Common wire nails, base per keg	\$3.30
Bolts and nuts, per cent off list	60

PACIFIC COAST

Base per Lb.

	San Francisco	Los Angeles	Seattle
Plates, tank and U. M.	4.05c.	4.30c.	4.25c.
Shapes, standard	4.05c.	4.30c.	4.25c.
Soft steel bars..	4.20c.	4.30c.	4.45c.
Reinforcing bars, f.o.b. cars dock Pacific ports..	2.975c.	2.975c.	3.625c.
Hot-rolled annealed sheets (No. 24)	5.15c.	5.05c.	5.35c.
Hot-rolled sheets (No. 10)	4.30c.	4.50c.	4.50c.
Galv. sheets (No. 24 and lighter)	5.85c.	5.55c.	5.90c.
Galv. sheets (No. 22 and heavier)	6.10c.	5.70c.	5.90c.
Cold-finished steel Rounds	6.30c.	6.85c.	7.10c.
Squares and hexagons..	8.05c.	8.10c.	7.10c.
Flats	8.55c.	8.60c.	8.10c.
Common wire nails—base per keg less carload	\$3.65	\$3.60	\$3.70

All items subject to differentials for quantity.

REFRACTORIES PRICES

Fire Clay Brick

Per 1000 f.o.b. Works

First quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois	\$54.00
First quality, New Jersey	56.00
Select, Ohio	49.00
Second quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois	49.00
Second quality, New Jersey	51.00
No. 1, Ohio	46.00
Ground fire clay, per ton	8.00
5 per cent trade discount on fire clay brick, except for New Jersey, quoted at net price.	

Silica Brick

Per 1000 f.o.b. Works

Pennsylvania	\$54.00
Chicago District	63.00
Birmingham	54.00
Silica cement per net ton (Eastern)	9.50
5 per cent trade discount on silica brick.	

Chrome Brick

Per Net Ton

Standard f.o.b. Baltimore, Plymouth Meeting and Chester..	\$49.00
Chemically bonded f.o.b. Baltimore, Plymouth Meeting and Chester, Pa.	49.00

Magnesite Brick

Per Net Ton

Standard f.o.b. Baltimore and Chester, Pa.	\$69.00
Chemically bonded, f.o.b. Baltimore	59.00

Grain Magnesite

Per Net Ton

Imported, f.o.b. Baltimore and Chester, Pa. (in sacks).....	\$45.00
Domestic, f.o.b. Baltimore and Chester, in sacks	43.00
Domestic, f.o.b. Chewelah, Wash.	25.00

RAW MATERIALS PRICES

PIG IRON

No. 2 Foundry

F.o.b. Everett, Mass.	\$25.75
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa., and Sparrows Point, Md.	25.00
Delivered Brooklyn	27.27
Delivered Newark or Jersey City	26.39
Delivered Philadelphia	25.76
F.o.b. Neville Island, Sharpsville and Erie, Pa.; Buffalo, Youngstown, Cleveland, Toledo and Hamilton, Ohio; Detroit; Chicago and Granite City, Ill.	24.00
F.o.b. Jackson, Ohio	25.75
Delivered Cincinnati	24.07
F.o.b. Duluth	24.50
F.o.b. Provo, Utah	22.00
Delivered San Francisco, Los Angeles or Seattle	25.00
F.o.b. Birmingham*	20.38

* Delivered prices on southern iron for shipment to northern points are 38c. a ton below delivered prices from nearest northern basing point on iron with phosphorus content of 70 and over.

Malleable

Base prices on malleable iron are 50c. a ton above No. 2 foundry quotations at Everett, Eastern Pennsylvania furnaces, Erie and Buffalo. Elsewhere they are the same.

Basic

F.o.b. Everett, Mass.	\$25.75
F.o.b. Bethlehem, Birdsboro, Swedeland and Steelton, Pa., and Sparrows Point, Md.	24.50
F.o.b. Buffalo	23.00
F.o.b. Neville Island, Sharpsville and Erie, Pa.; Youngstown, Cleveland, Toledo and Hamilton, Ohio; Detroit; Chicago and Granite City, Ill.	23.50
Delivered Cincinnati	24.51
Delivered Canton, Ohio	24.76
Delivered Mansfield, Ohio	25.26
F.o.b. Jackson, Ohio	25.50
F.o.b. Birmingham	19.00

Bessemer

F.o.b. Everett, Mass.	\$26.75
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa.	26.00
Delivered Boston Switching District	26.50
Delivered Newark or Jersey City	27.39
Delivered Philadelphia	26.76
F.o.b. Buffalo and Erie, Pa., and Duluth	25.00
F.o.b. Neville Island and Sharpsville, Pa.; Youngstown, Cleveland, Toledo and Hamilton, Ohio; Detroit; Chicago	24.50
F.o.b. Birmingham	25.50
Delivered Cincinnati	25.51
Delivered Canton, Ohio	25.76
Delivered Mansfield, Ohio	26.26

Low Phosphorus

Basing points: Birdsboro, Pa., Steelton, Pa., and Standish, N. Y.	\$28.50
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Gray Forge

Valley or Pittsburgh furnace	\$23.50
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Charcoal

Lake Superior furnace	\$27.00
Delivered Chicago	30.04

Canadian Pig Iron

Per Gross Ton

Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75	\$26.50
No. 2 fdy., sil. 1.75 to 2.25	25.50
Malleable	26.00
Basic	25.50
Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75	\$27.50
No. 2 fdy., sil. 1.75 to 2.25	27.00
Malleable	27.50
Basic	27.00

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.	
Domestic, 80% (carload)	\$102.50

Spiegeleisen

Per Gross Ton Furnace	
Domestic, 19 to 21%	\$33.00
F.o.b. New Orleans	33.00

Electric Ferrosilicon

Per Gross Ton Delivered	
50% (carloads)	\$69.50
50% (ton lots)	77.00
75% (carloads)	126.00
75% (ton lots)	136.00

Silvery Iron

Per Gross Ton	
F.o.b. Jackson, Ohio, 5.00 to 5.50%	\$27.50

For each additional 0.5% silicon up to 17%, 50c. a ton is added.
The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed.
Base prices at Buffalo are \$1.25 a ton higher than at Jackson.
Manganese, each unit over 2%, \$1 a ton additional.
Phosphorus 0.75% or over, \$1 a ton additional.

Bessemer Ferrosilicon

F.o.b. Jackson, Ohio, Furnace	
Per Gross Ton	
10.00 to 10.50%	\$33.50
10.51 to 11.00%	34.00
11.01 to 11.50%	34.50
11.51 to 12.00%	35.00
12.01 to 12.50%	35.50
12.51 to 13.00%	36.00
13.01 to 13.50%	36.50
13.51 to 14.00%	37.00
14.01 to 14.50%	37.50
14.51 to 15.00%	38.00
15.01 to 15.50%	38.50
15.51 to 16.00%	39.00
16.01 to 16.50%	39.50
16.51 to 17.00%	40.00
Manganese 2 to 3%, \$1 a ton additional. For each unit of manganese over 3%, \$1 a ton additional. Phosphorus 0.75% or over, \$1 a ton additional.	
Base prices at Buffalo are \$1.25 a ton higher than at Jackson.	

Other Ferroalloys

Ferrotungsten, per lb. contained W del., carloads	\$1.70
Ferrotungsten, lots of 5000 lb.	\$1.75
Ferrotungsten, smaller lots	\$1.80
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr per lb. contained Cr delivered, in carloads, and contract	10.50c.*
Ferrochromium, 2% carbon	16.50c. to 17.00c.*
Ferrochromium, 1% carbon	17.50c. to 18.00c.*
Ferrochromium, 0.10% carbon	19.50c. to 20.00c.*
Ferrochromium, 0.06% carbon	20.00c. to 20.50c.*
Ferrovandium, del. per lb. contained V	\$2.70 to \$2.90
Ferrocolumbium, per lb. contained columbium, f.o.b. Niagara Falls, N. Y.	\$2.50*
Ferrocobaltitanium, 15 to 18% Ti, 7 to 8% C, f.o.b. furnace carload and contract per net ton	\$142.50
Ferrocobaltitanium, 17 to 20% Ti, 3 to 5% C, f.o.b. furnace, carload and contract, per net ton	\$157.50
Ferrophosphorus, electric, or blast furnace material, in carloads, f.o.b. Anniston, Ala., for 18%, with \$3 unitage, freight equalized with Rockdale, Tenn., per gross ton	63.50
Ferrophosphorus, electric, 24%, in carlots, f.o.b. Anniston, Ala., per gross ton with \$3 unitage, freight equalized with Nashville, Tenn.	80.00
Ferromolybdenum, per lb. Mo del.	95c.
Calcium molybdate, per lb. Mo del.	80c.
Silico spiegel, per ton, f.o.b. furnace, carloads	\$45.00
Ton lots or less, per ton	50.00
Silico-manganese, gross ton, delivered	101.50
3% carbon grade	106.50
2% carbon grade	111.50
1% carbon grade	121.50

* Spot prices are \$5 a ton higher. Spot premium on 75 per cent ferrosilicon is \$10 a ton.

ORES

Lake Superior Ores

Delivered Lower Lake Ports	
Per Gross Ton	
Old range, Bessemer, 51.50%	\$5.25
Old range, non-Bessemer, 51.50%	5.10
Mesabi, Bessemer, 51.50%	5.10

Mesabi, non-Bessemer, 51.50%	\$4.95
High phosphorus, 51.50%	4.85

Foreign Ore

C.i.f. Philadelphia or Baltimore

Per Unit	
Iron, low phos., copper free, 55 to 58% dry, Algeria, nominal	17.00c.
Iron, low phos., Swedish, average, 68½% iron	Nominal
Iron, basic or foundry, Swedish, aver. 65% iron	Nominal
Iron, basic or foundry, Russian, aver. 65% iron	Nominal
Man., Caucasian, washed	
52%	47c.
Man., African, Indian, 44-48%	Nominal
Man., African, Indian, 49-51%	Nominal
Man., Brazilian, 46 to 48½%	Nominal

Per Net Ton Unit

Tungsten, Chinese, wolframite, duty paid delivered nominal	\$23.50 to \$25.50
Tungsten, domestic, scheelite delivered	Nominal
Chrome ore (lump) c.i.f. Atlantic Seaboard, per gross ton: South African (low grade)	\$16.00
Rhodesian, 45%	23.00
Rhodesian, 48%	26.50
Turkish, 48-49%	25.50 to \$26.50
Turkish, 45-46%	23.50 to 24.00
Turkish, 44%	19.00 to 19.50
Chrome concentrates (Turkish) c.i.f. Atlantic Seaboard, per gross ton: 50%	\$24.50 to \$25.00
48-49%	25.50 to 26.50

FLUORSPAR

Per Net Ton

Domestic, washed gravel, 85-5, f.o.b. Kentucky and Illinois mines, all rail	\$20.00
Domestic, barge and rail	\$19.50 to 21.50
No. 2 lump, 85-5, f.o.b. Kentucky and Illinois mines	21.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic ports, duty paid	24.50
Domestic No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	35.00

FUEL OIL

Per Gal.

F.o.b. Bayonne or Baltimore, No. 3 distillate	5.25c.
F.o.b. Bayonne or Baltimore, No. 4 industrial	5.25c.
Del'd Ch'go, No. 3 industrial	4.15c.
Del'd Ch'go, No. 5 industrial	4.00c.
Del'd Cleve'd, No. 3 distillate	5.75c.
Del'd Cleve'd No. 4 industrial	5.75c.
Del'd Cleve'd No. 5 industrial	5.00c.

COKE AND COAL

Coke Per Net Ton

Furnace, f.o.b. Connellsville, Prompt	\$4.35 to \$4.60
Foundry, f.o.b. Connellsville, Prompt	5.00 to 6.25
Foundry, by-product, Chicago ovens	10.25
Foundry, by-product, del'd New England	12.50
Foundry, by-product, del'd Newark or Jersey City	10.85 to 11.30
Foundry, by-product, Philadelphia	10.60
Foundry, by-product, delivered Cleveland	11.00
Foundry, by-product, delivered Cincinnati	10.50
Foundry, Birmingham	7.50
Foundry, by-product, del'd St. Louis industrial district	11.00 to 11.50
Foundry, from Birmingham, f.o.b. cars docks, Pacific ports	14.75

Coal Per Net Ton

Mine run steam coal, f.o.b. W. Pa. mines	\$1.50 to \$1.75
Mine run coking coal, f.o.b. W. Pa.	1.75 to 1.90
Gas coal, ¼-in. f.o.b. Pa. mines	2.00 to 2.25
Mine run gas coal, f.o.b. Pa. mines	1.80 to 2.00
Steam slack, f.o.b. W. Pa. mines	1.00 to 1.25
Gas slack, f.o.b. W. Pa. mines	1.20 to 1.45



PLANT EXPANSION AND EQUIPMENT BUYING

◀ NORTH ATLANTIC ▶

Johns-Manville Corp., 22 East Fortieth Street, New York, roofing products, insulating materials, etc., has engaged Stone & Webster Engineering Corp., Boston, to design and supervise erection of new branch plant on 50-acre tract at Los Angeles, comprising one and multi-story units, with power house and other mechanical departments. Cost about \$1,000,000 with equipment. Engineering company noted has branch office at 601 West Fifth Street, Los Angeles.

Pittsburgh Valve & Fittings Co., Barberton, Ohio, has leased about 12,000 sq. ft. in building at 48-18 Van Dam Street, Long Island City, for new Eastern factory branch, storage and distributing plant.

Commanding Officer, Ordnance Department, Watervliet Arsenal, Watervliet, N. Y., asks bids until July 20 for one carbide brazing electric furnace (Circular 3).

Consolidated Edison Co. of New York, 4 Irving Place, New York, is arranging fund of \$42,000,000 for expansion and improvements in steam-electric generating plants, power substations and switching stations, underground and overhead lines, and other operating facilities.

Socony-Vacuum Oil Co., Inc., 26 Broadway, New York, will carry out expansion and improvements in branch Atlas refinery at Buffalo, with installation of oil distillation machinery for lubricating oil production, new vacuum tower for gasoline division, and other equipment for converting crude oil into refined oil products. Cost close to \$100,000. Company also has approved plans for two-story addition to branch refinery at Franklin, Pa., for expansion in grease division, to cost about \$50,000 with equipment, and will carry out expansion in refinery at Cleveland to cost over \$75,000. A five-acre tract is being secured on water front at South St. Louis, Mo., for new gasoline refinery, with cracking and other machinery, steel tank storage and distributing facilities. Cost close to \$200,000.

Commanding Officer, Ordnance Department, Picatinny Arsenal, Dover, N. J., asks bids until July 30 for 21,500 lb. seamless steel tubing (Circular 900).

MacAndrews & Forbes Co., Jefferson and Third Streets, Camden, N. J., manufacturer of wallboard products, etc., has let general contract to Barclay White & Co., 22 North Thirty-sixth Street, Philadelphia, for addition to power plant. Cost about \$45,000 with equipment.

American Brass Co. of Pennsylvania, 117 South Seventeenth Street, Philadelphia, unit of American Brass Co., Waterbury, Conn., has acquired building, about 30,000 sq. ft. floor space, at Norris and Howard Streets, on site, 110 x 191 ft., for factory branch, storage and distributing plant.

Commanding Officer, Ordnance Department, Frankford Arsenal, Philadelphia, asks bids until July 27 for 855,000 annealed cartridge brass disks for 1.1 cartridge case (Circular 3); until July 28, one multiple spindle, automatic drilling, counterboring, milling and tapping machine (Circular 922).

◀ NEW ENGLAND ▶

Landers, Frary & Clark, Inc., New Britain, Conn., manufacturer of electric heating and cooking appliances and other domestic electric equipment, has plans for one-story addition, including extension to connect new unit with present enameling works. Cost over \$50,000 with equipment. W. F. Brooks, Lewis and Gold Streets, Hartford, Conn., is architect.

Commanding Officer, Ordnance Department, Watertown Ordnance Depot, Watertown, Mass., asks bids until July 19 for alloy steel forgings (Circular 3).

Armstrong Rubber Co., West Haven, Conn., automobile tires and tubes, has let general contract to E. & F. Construction

Co., 94 Wells Street, Bridgeport, Conn., for three-story and basement addition, 80 x 100 ft. Cost about \$85,000 with equipment. Fletcher-Thompson, Inc., 1336 Fairfield Avenue, Bridgeport, is architect and engineer.

General Electric Co., Bridgeport, Conn., will expand wire and cable manufacturing division at local plant, including equipment to increase production about 50 per cent. W. Stewart Clark is manager at Bridgeport works.

Commanding Officer, Ordnance Department, Springfield Armory, Springfield, Mass., asks bids until July 30 for one power factor-correcting capacitor (Circular 332).

◀ BUFFALO DISTRICT ▶

Delco Appliance Corp., 391 Lyell Avenue, Rochester, N. Y., manufacturer of isolated electric lighting plants, water systems, etc., a division of General Motors Corp., has asked bids on general contract for one-story addition, including new steam power house. Cost over \$100,000 with equipment. Albert Kahn, Inc., Detroit, is architect and engineer.

United States Engineer Office, Federal Building, Buffalo, asks bids until July 30 for two cast steel pump impellers, one cast steel socket and retaining ring, one cast steel ball joint elbow, two pump impellers, two cast steel throat liners, and three cast steel drag heads (Circular 150).

Corning Glass Works, Corning, N. Y., has plans for one and multi-story structure for general production, totaling 200,000 sq. ft. floor space, and a four-story manufacturing and laboratory building, about 36,000 sq. ft. floor space, latter to replace former Nos. 1 and 2 units. Cost close to \$400,000 with equipment.

Burt Cold Storage & Packing Co., Burt, N. Y., food canner and packer, has plans for two-story and basement canning plant, 60 x 175 ft. Cost close to \$60,000 with equipment.

◀ WASHINGTON DIST. ▶

Baltimore Pure Rye Distilling Co., Dundalk, Md., has asked bids on general contract for six-story addition, primarily for storage and distribution. Cost close to \$100,000 with equipment.

Superintendent, Federal Reformatory Camp, Petersburg, Va., asks bids until July 19 for eight road scrapers, files, bolts, halter chains and other equipment (Proposal 6); until July 23, one hammermill-type mill and one 30-hp. electric motor (Proposal 5).

Standard Cap & Molding Co., Inc., 311 West Baltimore Street, Baltimore, manufacturer of metal specialties, has let general contract to Herbert J. West, Knickerbocker Building, for new one-story plant, 60 x 100 ft., at 307 South Eaton Street. Cost over \$40,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until July 20 for one motor-driven, precision screw-cutting bench lathe (Schedule 1181), motor-driven hydraulic pumps (Schedule 1178), nails, tacks and spikes (Schedule 1148), hinges (Schedule 1170), cotter, escutcheon and taper pins (Schedule 1183), locks and latches (Schedule 1168), centrifugal type ventilation equipment (Schedule 1175); until July 23, steel forgings and shaftings (Schedule 1217); until July 27, main reduction gears (Schedule 1218), circuit breakers, switches, relays, transformers and kindred equipment (Schedule 1209), electric generators, switchboards and spare parts (Schedule 1215) for Eastern and Western Navy Yards; until July 20, steel forgings (Schedule 1180) for Newport, R. I. yard; electric cable (Schedule 1184) for Portsmouth and Mare Island yards; until July 23, sheet steel boxes and galvanized sheet steel cans (Schedule 1185) for Yorktown, Va., yard; centrifugal

tachometers and chronometric tachometers (Schedule 1198) for Sewall's Point and Mare Island yards.

◀ SOUTH ATLANTIC ▶

Ford Motor Co., Dearborn, Mich., plans one-story addition, 300 x 520 ft., to branch assembling plant at Norfolk, Va. A new 400-ft. dock will be built on Elizabeth River, near main works, for loading assembled automobiles for water shipment, with cranes, hoists and other mechanical-handling equipment. Total cost about \$500,000.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until July 23 for spare parts for airplanes (Schedule 900-978), parts for airplanes (Schedule 900-810) for Pensacola, Fla., Naval Air Station.

East Coast Growers' Association, 109 S.E. First Street, Miami, Fla., has asked bids on general contract for one-story storage and distributing building, 100 x 100 ft. Cost over \$50,000 with conveying, loading and other mechanical-handling equipment. Edward Nolan, Professional Building, is architect.

◀ WESTERN PA. DIST. ▶

Aluminum Co. of America, Inc., Pittsburgh, has purchased large tract at Lafayette, Ind., for branch plant, comprising several one-story units, for production of aluminum tubing, extruded aluminum shapes and similar products. Cost about \$3,000,000 with equipment. J. A. Schreiber is company engineer in charge.

Chase Brass & Copper Co., 855 North Avenue West, Pittsburgh, has revised plans for three-story storage and distributing plant, 50 x 220 ft. Cost about \$75,000 with equipment. An office building also will be erected. Contract recently let for a two and three-story plant unit has been rescinded. Main offices of company are at Waterbury, Conn.

Taylor Aircraft Co., Bradford, Pa., has purchased plant of Susquehanna Silk Mills, Lock Haven, Pa., including about 16 acres. New owner will remodel for new main plant, with parts production and assembling departments, replacing former works at Bradford, destroyed by fire several weeks ago with loss close to \$150,000. Company plans airport at new location, with hangars, repair and reconditioning facilities, and other structures.

General Electric Co., East Lake Road, Erie, Pa., has let general contract to H. Platt Co., 922 Raspberry Street, for one-story addition, 90 x 300 ft., to electric refrigerator manufacturing plant, for steel refrigerator cabinet production. Cost close to \$150,000 with equipment. H. L. R. Emmett is manager at local works; H. C. Mitchell is company engineer.

◀ OHIO AND INDIANA ▶

Elyria Foundry Co., Elyria, Ohio, manufacturer of machine tool and other castings, has plans for three-story addition, 90 x 125 ft. Cost over \$75,000 with equipment. Company is affiliated with Industrial Brown Hoist Co., Bay City, Mich.

Rheem Mfg. Co., Richmond, Cal., manufacturer of steel barrels, drums and kindred products, has purchased plant and business of National Steel Barrel Co., 3860 East Ninety-first Street, Cleveland, and will operate as a unit of organization.

B. F. Goodrich Co., Akron, Ohio, automobile tires, tubes and mechanical rubber goods, has let general contract to Carmichael Construction Co., 148 East Miller Street, for three-story addition, 40 x 115 ft. Cost close to \$160,000 with equipment.

United States Engineer Office, Zanesville, Ohio, asks bids until Aug. 10 for one 5000 gal. per min. electric-operated pumping unit and two 11,000 gal. per min. gasoline engine-driven pumps for Magnolia levee; one 2000 gal. per min. electric-operated pump and two 6000 gal. per min. gasoline engine-driven pumping units for Sandyville levee; equipment to include motors, starting apparatus, engines, gear drives, piping and all accessories.

Jaeger Machine Co., Michigan Avenue, Columbus, Ohio, manufacturer of contractors' machinery and parts, has let general contract to Austin Co., Cleveland, for one-story plant unit. Cost about \$50,000 with equipment.

Contracting Officer, Material Division, Army Air Corps, Wright Field, Dayton, Ohio, asks bids until July 27 for about 1100 engine gage units, 1100 thermometers

assemblies, pressure gages in lots of 50 to 300, and manifold pressure gage assemblies in lots of 600 to 1100 (Circular 869); until July 29, airspeed indicator assemblies in lots of 400 to 800, and airspeed tube assemblies in lots of 500 to 1000 (Circular 867); until July 30, indicator thermocouple assemblies in lots of 500 to 1000 (Circular 868).

American Coating Mills, Inc., Elkhart, Ind., manufacturer of coated paper and boxboard stocks, has let general contract to Sollitt Construction Co., 109 North Dearborn Street, Chicago, for one-story and basement addition. Cost close to \$100,000 with machinery. C. C. Colbert is manager at plant.

◀ SOUTH CENTRAL ▶

Shell Petroleum Corp., Shell Building, St. Louis, plans several one and multi-story units for expansion at oil refinery, Norco, La., to include extensions in steel tank storage and distributing facilities. Cost close to \$700,000 with machinery. Branch office of company is in Canal Bank Building, New Orleans.

Common Council, Jamestown, Ky., will take bids soon for 60,000-gal. elevated steel tank and 60-ft. steel tower for municipal water system. Howard K. Bell, McClelland Building, Lexington, Ky., is consulting engineer.

Hercules Powder Co., Paper Makers Chemical Division, Marrero, La., manufacturer of industrial chemicals, etc., has let general contract to Industrial Engineering & Construction Co., Hibernia Bank Building, New Orleans, for one-story addition, primarily for storage and distribution. Cost over \$35,000 with equipment.

United States Engineer Office, Vicksburg, Miss., asks bids until July 20 for one hauling and hoisting winch for Sardin dredge (Circular 323); one dredging ladder complete, including spart parts (Circular 288).

◀ MIDDLE WEST ▶

Union Special Machine Co., 400 North Franklin Street, Chicago, manufacturer of industrial sewing machines and parts, has let general contract to R. C. Wieboldt, 1412 West Washington Boulevard, for three-story and basement addition. Cost over \$75,000 with equipment. Ivar Viehe-Naess, 5809 North Ridge Avenue, is architect.

Ingersoll Milling Machine Co., 2400 Douglas Avenue, Rockford, Ill., has let general contract to Security Building Co., 717 East Jefferson Street, for one-story addition, 56 x 273 ft., primarily for storage and distribution. Cost close to \$60,000 with equipment. Frank D. Chase, Inc., 307 North Michigan Avenue, Chicago, is architect and engineer.

International Harvester Co., 606 South Michigan Avenue, Chicago, plans early rebuilding of part of plant at Canton, Ill., recently destroyed by fire. Loss close to \$200,000 with equipment. Adam Condo is superintendent of works.

City Council, Detroit Lakes, Minn., asks bids until July 19 for addition to municipal electric power plant, including steam turbo-generator unit and accessories, condenser and pumps, boiler unit and auxiliary equipment, stoker and fan, cooling tower and other equipment. Cost about \$200,000. Foster & Wahlberg, Medical Arts Building, Duluth, Minn., are engineers.

Paxton-Mitchell Co., Twenty-sixth and Martha Streets, Omaha, Neb., manufacturer of metal products, metallic packing, etc., has let general contract to A. Borchman Sons Co., 4002 Lake Street, for two-story and basement addition, 108 x 114 ft., primarily for a foundry. Cost over \$50,000 with equipment.

United States Engineer Office, Rock Island, Ill., asks bids until July 30 for power, control and lighting system at lock and dam No. 12, Mississippi River, Bellevue, Iowa, including electric tow-haulage unit, hand-operated traveling bridge crane, gasoline-electric standby power unit, sump pump, portable lighting units, signal system, storage yard lighting system, transformers and regulators, automatic emergency lighting system, etc. (Circular 265).

Mid-West Electric Mfg. Co., 1639 Walnut Street, Chicago, manufacturer of electrical specialties, has let general contract to Frank Munao, 4959 School Street, for one-story addition, 37 x 105 ft. Cost over \$30,000 with equipment.

La Crosse, Wis., Tribune and Leader-

Press has plans by Krause & Klein, architects, Davenport, Iowa, for new daily newspaper publishing and general printing plant to cost \$100,000.

Northwestern Fuel Co., 1203 First National Bank Building, St. Paul, Minn., has placed contracts for machine shop and service building at docks in Superior, Wis., to cost about \$40,000. Roland C. Buck, Inc., Superior, is consulting engineer.

Pittsburgh Supply Co., Cleveland, has placed contracts for bulk oil storage and distribution plant at Sault Ste. Marie, Mich. Cost about \$125,000. William R. Maxwell is local manager.

Nu-Scrap Briquetting Co., Milwaukee, has been incorporated by officers of Milwaukee Automotive Trades, Inc., and is establishing plant at 219 South Sixteenth Street to utilize reclaimed metal for general scrap market. Palmer Hanson, 4125 West Blue Mound Road, is executive secretary.

Wisconsin Gray Iron Foundry Co., 7225 West Main Street, Milwaukee, which has been occupying this unit of J. I. Case Co., Racine, Wis., under lease, has purchased gray iron foundry department of old National Brake & Electric Co., foot of East Bellevue Place, Milwaukee, from Westinghouse Air Brake Co., Pittsburgh. About \$20,000 will be spent in modernizing plant, which affords 30,000 sq. ft., doubling present facilities. Case company is reported planning to use Milwaukee foundry soon for its own purposes.

◀ MICHIGAN DISTRICT ▶

Pontiac Motor Co., Pontiac, Mich., has plans for one-story foundry, 88 x 230 ft., to be located between two present foundry units. Work will be carried out in conjunction with other additions, one-story, 62 x 120 ft., on which work has begun, and two stories, 40 x 390 ft. Entire project will cost over \$250,000 with equipment. H. J. Klingler is general manager.

King-Seely Corp., Josselyn Avenue, Ann Arbor, Mich., manufacturer of liquid measuring devices and equipment, gages, etc., has let general contract to Ann Arbor Construction Co., Ann Arbor, for one-story addition, 80 x 180 ft., and improvements in present plant. Cost over \$60,000 with equipment. Giffels & Vallet, Inc., Marquette Building, Detroit, is architect and engineer.

Thumb Electric Co-operative of Michigan, Inc., Uby, Huron County, Mich., has plans for new steam-electric generating plant near Uby, to cost about \$300,000 with equipment. Work will be carried out in connection with a rural electrification project in Huron and neighboring counties, totaling 1800 miles of lines. Fund of \$2,000,000 has been secured through Federal aid.

Fisher Body Corp., General Motors Building, Detroit, has plans for one-story die shop and other one-story units to branch plant at Cleveland. Cost close to \$500,000 with equipment. H. E. Beyster, first noted address, is company architect.

Union Steel Products Co., North Berrien Street, Albion, Mich., manufacturer of steel wire goods, baking plant equipment, etc., has let general contract to Perry T. Sharp, Albion, for one-story addition. Cost close to \$40,000 with equipment. Frank E. Dean, Albion, is architect.

◀ SOUTHWEST ▶

Bay Petroleum Corp., Denver, has purchased oil refinery of Dickel Oil Refining Co., Wichita, Kan., for about \$500,000 and plans expansion and improvements, with additional equipment to double present capacity, including steel tank storage and distributing facilities. Cost over \$200,000 complete.

Missouri-Pacific Railroad Co., Missouri-Pacific Building, St. Louis, has let general contract to Patti Construction Co., 1114 Broadway, Kansas City, Mo., for addition to engine house and repair shops in East Bottoms district, Kansas City. Cost close to \$60,000 with equipment. S. L. Wonsom, first noted address, is assistant chief engineer in charge.

Globe Oil & Refining Co., McPherson, Kan., has work under way on expansion and improvements in oil refinery, including additional equipment. Cost close to \$100,000 with machinery.

Standard Brass & Mfg. Co., 1015 North San Jacinto Street, Houston, Tex., has plans for new plant, comprising two one-story units, one for general production and other for storage and distribution; last noted structure will be erected first. Cost

over \$50,000 with equipment. John F. Staub, 4301 Main Street, is architect.

Adleta Showcase & Fixture Mfg. Co., 1900 Cedar Springs Road, Dallas, Tex., has begun work on three-story addition for general production. Cost over \$65,000 with machinery.

Humble Oil & Refining Co., Houston, Tex., plans new natural gasoline plant in Dickinson oil field district, northern part of Galveston County, with power house, compressor station, steel tank storage and distributing department and other structures. Cost close to \$250,000 with equipment.

◀ PACIFIC COAST ▶

Richfield Oil Corp., 555 South Flower Street, Los Angeles, plans new oil refinery at Watson, Cal., supplementing present plant at that place, to include one and multi-story buildings for main refinery, two combination crude topping and cracking units for gasoline production, new polymerization plant, reactionating towers, pumping units, receiving houses, heater building, steel tank storage and distributing division, and other units. Cost close to \$5,000,000 with machinery.

Swift & Co., Chicago, and 3750 Jewel Avenue, Los Angeles, meat packer, will take bids on general contract in about a month for new plant on Jewel Avenue, replacing present plant at First Street and Santa Fe Avenue. Cost about \$1,000,000 with machinery.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until July 20 for 12,000 solderless electric cable connections (Schedule 1176); until July 23, steel welding elbows (Schedule 1190); until July 30, 65,800 lb. of steel forgings (Schedule 1201) for Mare Island Navy Yard; until July 20, motor-driven, high-pressure hydraulic pump (Schedule 1177) for Puget Sound yard; until July 23, 918 storage batteries (Schedule 1189) for Mare Island and Puget Sound yards.

American Laundry Machinery Co., 566 First Avenue South, Seattle, is considering one-story factory branch, storage and distributing plant at Elliott Avenue and Denny Way. Cost close to \$40,000 with equipment. Company headquarters are at Norwood, Cincinnati.

W. P. Fuller & Co., 135 North Los Angeles Street, Los Angeles, manufacturers of paints, lacquers, varnishes, etc., have let general contract to Myers Brothers, 2407 San Fernando Road, for one-story plant, 62 x 113 ft., primarily for lacquer production. Cost close to \$50,000 with equipment, including tanks, conveyers, etc. Gordon B. Kaufmann, 627 South Carondelet Street, is architect.

Bureau of Reclamation, Denver, asks bids until July 27 for steel warehouse building for Government camp at Kennett Dam, Central Valley Project, Cal. (Specifications 947-D).

◀ FOREIGN ▶

J. Tinsley, Ltd., Nestfield Engine Works, Albert Hill, Darlington, England, manufacturer of engines and parts, haulage gears, etc., plans several one-story units for expansion in parts production and assembling divisions. Cost over \$500,000 with equipment.

George Weston Foods, Ltd., Cardiff, Wales, England, manufacturer of food products, has acquired large tract for new one-story plant. Cost close to \$400,000 with equipment.

Coulter Mfg. Co., Ltd., Oshawa, Ont., manufacturer of automobile parts and equipment, plans rebuilding part of plant recently destroyed by fire. Loss over \$150,000 with machinery.

Rugby Cement Co., Ltd., Halling, England, has plans for new mill with storage and distributing buildings, power house, machine shop and other mechanical departments. Cost over \$750,000 with equipment.

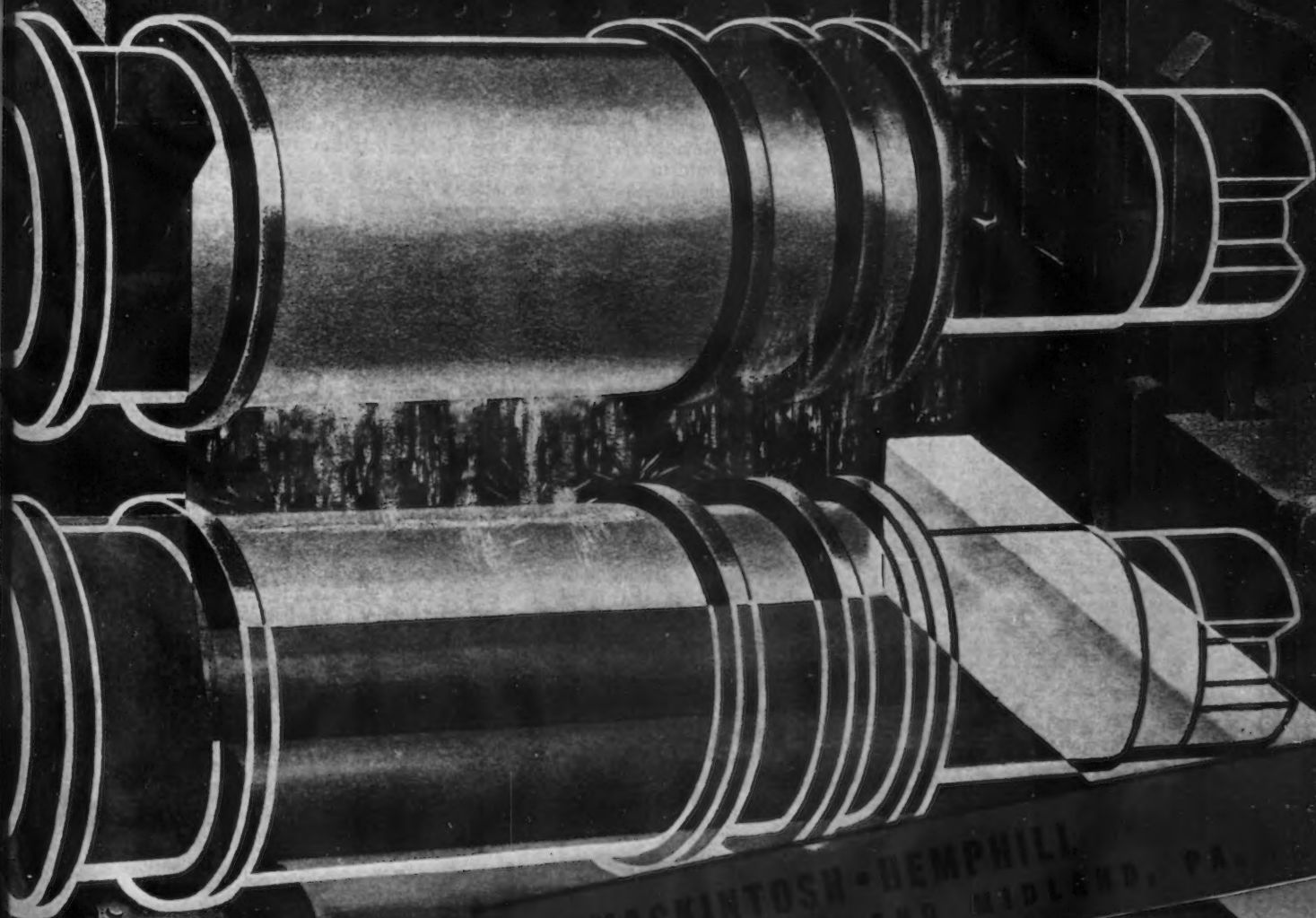
Hiram Walker & Sons (Glasgow), Ltd., Glasgow, Scotland, has approved plans for new distillery on site formerly occupied by shipyard of Archibald McMillan & Son, Ltd., Dumbarton, Scotland. Plant will comprise one and multi-story units, with storage and distributing buildings. Cost close to \$2,000,000 with machinery.

Courtaulds (Canada), Ltd., Cornwall, Ont., manufacturer of cellulose rayon products, has authorized expansion and improvements in mill, including equipment. Cost about \$3,000,000. Appropriation in that amount has been approved.

ARE YOU SATISFIED WITH THE PERFORMANCE OF YOUR BLOOMING MILL ROLLS?

Mackintosh-Hemphill metallurgists have developed a Special Alloy Steel Roll which is giving exceptional tonnages on blooming mills. Roll life of 300,000 tons is not unusual on these Mackintosh Blooming Mill Rolls.

These rolls have maximum strength, toughness and resistance to fire-cracking. Clean blooms today are more important than ever before, and if you have fire-cracking troubles, we can help you solve them. May we have an opportunity of talking over your roll problems?



MACKINTOSH-HEMPHILL
PITTSBURGH AND MIDLAND, PA.

Drop Forgers Adopt Standard Tolerances

(CONTINUED FROM PAGE 47)

any displacement caused by variation in thickness of the forging.

The trimmed size is not to be greater nor less than the limiting sizes at the parting plane imposed by the sum of the draft angle tolerances and the shrinkage and die wear tolerances.

Draft angle tolerances, Table IV, are the permissible variations from the standard or nominal angle of draft. Quantity tolerances, Table V, represent the permissible over or under-run allowed for each release or part shipment of an order. Commercial and close quantity tolerances are the same.

Fillet and corner tolerances, Table VI, apply to all meeting surfaces even though drawings and/or models indicate sharp corners, unless they indicate fillet or corner dimensions of larger radii than the standard, in which case such actual or indicated larger dimensions shall be considered as actually specified and the tolerances shall be special tolerances.

Fillet tolerances apply to inside corners and edges in all forgings in which surfaces meet at any angle less than 180 deg. Corner toler-

ances apply to outside corners and edges in which surfaces meet at an angle greater than 180 deg. Where a corner tolerance applies on the meeting of two drafted surfaces, the tolerance applies to the narrow

end of such meeting and the radius increases toward the wide end. The total increase in the radius is equal to the length of the drafted surface in inches multiplied by the tangent of the nominal draft angle.

World Scramble For Iron Ore Brought About By European Armament Race

LONDON (Special Correspondence).—A world scramble for iron ore has been brought about by the armament race. The situation has gone beyond the purely commercial into the realm of international political relations. Hitler's recent candid admission that Germany is supporting Franco in the Spanish civil war because she wants to be able to buy Spanish iron ore has created great interest in Great Britain.

The ore is located in the Basque country and at present is mainly exported to Britain. Since July, 1936, practically all the iron exports from Bilbao have come to the United Kingdom. Should these supplies be cut off, not only would Britain be involved in a serious financial loss, but also in a slowing down of the big rearmament program now in progress. If Franco triumphs, he is almost certain to grant important iron ore concessions to Germany, in which case Britain would lose a source of supply of this commodity which she cannot afford.

Asked in the House of Commons recently for the latest available figures of the consumption of Basque iron ore in the United Kingdom, the president of the Board of Trade replied that imports from Northern Spain amounted to 972,300 tons in 1935 and to 962,300 tons in 1936. More recent information is not available, but President Stanley declared that up till quite recently there had been no serious interruption of supplies from Northern Spain.

In spite of the Spanish problem and other difficulties, however, Britain is not at the moment faced with the shortage of foreign ore which some people anticipated. The recent statements in the German press that owing to reduced supplies of foreign ore Britain's rearmament program was already in danger are incorrect. Spain and Morocco together produce not more than 4,000,000 tons of iron ore annually out of a world output of about 175,000,000 tons. Indeed one of the British mines abroad has re-

cently been able to sell to Germany nearly the whole of its iron ore output over a period of years. Such a sale would never have been concluded had Britain's own position not appeared reasonably safe.

Last year Germany took 75 per cent of the Swedish iron ore export and Britain only 14 per cent. Germany will now doubtless get more from Spain, but this should not have any serious influence on British industry. Last year Britain purchased approximately 18 per cent of her iron ore requirements from Spain, but recently the figure has decreased to 11 per cent.

If an increased output is required to satisfy Britain's greater demands permission will have to be obtained from the Swedish Parliament, and, as current prices are unusually profitable, that permission may in time be granted.

An increased proportion of the ore used in British steel works now comes from British mines.

Further Australasian Iron Deposits to Be Exploited

Since the decision to exploit the vast Yampi Sound iron ore deposits of Western Australia was announced, further Australasian iron developments have been decided on.

The manufacture of iron from the iron sands which abound on the west coast of New Zealand has just been started by a subsidiary of the Duffield Iron Corp. of London. The company has been testing the feasibility of the new industry for several years past.

Another interesting development is taking place in Tasmania, where Tasmanian Iron Ore Mines, Ltd., has been formed in Hobart for the purpose of establishing smelting and other works for the manufacture of steel tubes and fittings, pig iron and foundry iron from the Blythe River iron ore deposits on the northwest coast of the island. It was originally intended by the promoters to ship the ore to Japan for sale, but it has now been decided that the company should establish its own works and begin manufacturing.

TABLE V—Quantity Tolerances

No. of Pieces on Order	Pieces Over-Run	Pieces Under-Run
1 to 2	1	0
3 to 5	2	1
6 to 19	3	1
20 to 29	4	2
30 to 39	5	2
40 to 49	6	3
50 to 59	7	3
60 to 69	8	4
70 to 79	9	4
80 to 99	10	5
100 to 199	10 per cent	5.0 per cent
200 to 299	9 per cent	4.5 per cent
300 to 599	8 per cent	4.0 per cent
600 to 1,249	7 per cent	3.5 per cent
1,250 to 2,999	6 per cent	3.0 per cent
3,000 to 9,999	5 per cent	2.5 per cent
10,000 to 39,999	4 per cent	2.0 per cent
40,000 to 299,999	3 per cent	1.5 per cent
300,000 up	2 per cent	1.0 per cent

TABLE VI—Fillet and Corner Tolerances

Net Weights up to	Commercial	Close
0.3 lb.....	3/32 in.	3/64 in.
1 lb.....	1/8 in.	1/16 in.
3 lb.....	5/32 in.	5/64 in.
10 lb.....	3/16 in.	3/32 in.
30 lb.....	7/32 in.	7/64 in.
100 lb.....	1/4 in.	1/8 in.